

AD-A053 050 HYDROACOUSTICS INC ROCHESTER N Y  
HVLf-1 CALIBRATION DATA. (U)  
FEB 78

HYDROACOUSTICS INC ROCHESTER N Y  
HVL-1 CALIBRATION DATA.(U)  
FEB 78

HVL-1 CALIBRATION DATA. (U)

FEB 78

F/G 17/1

**UNCLASSIFIED**

HA-105-78

**N00039-76-C-0461**

NL

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AD  
A053050

Age	18-24
Sex	Male
Time of day	10:00-12:00

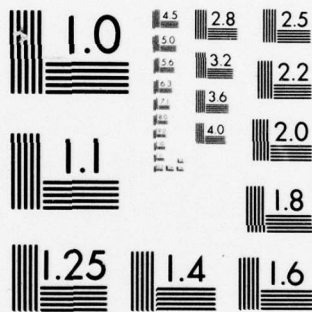
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6-78

DDC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

AD A 053050

AD NO. \_\_\_\_\_  
DDC FILE COPY

Report No. HA-105-78

6 HVLF-1

CALIBRATION DATA

11 14 February 1978

12 42p

15 N00039-76-C-0461

Submitted to:

Naval Electronic Systems Command  
Code ELEX 3203  
PME 124-62

DDC  
RECEIVED  
APR 24 1978  
A

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**HYDROACOUSTICS INC.**

321 NORTHLAND AVE. P.O. BOX 3818 ROCHESTER, N. Y. 14610

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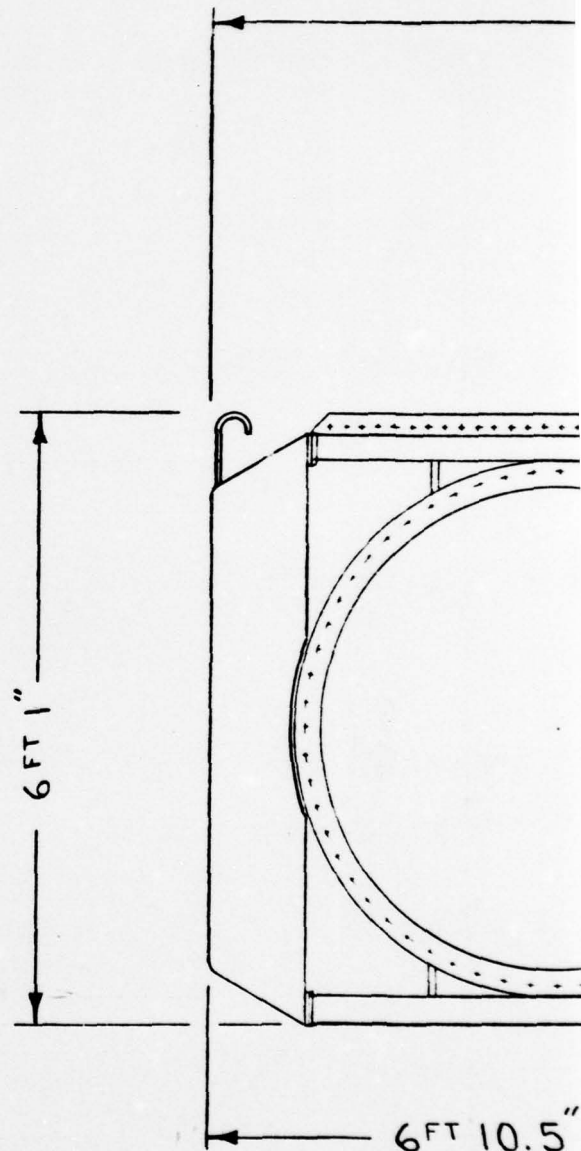
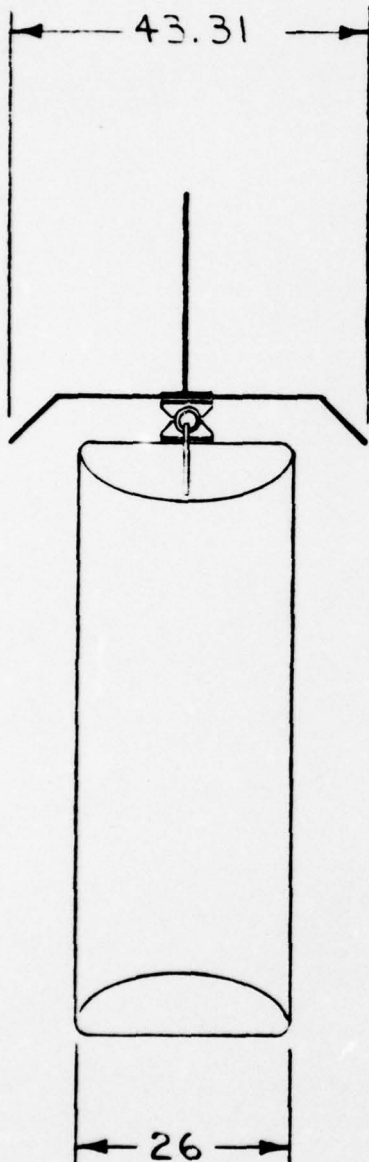
## 1.0 INTRODUCTION

→ The HVLF-1 acoustic source was developed for NAVELEX Codes 320 and PME-124 under Contract N00039-76-C-0461. The source is incorporated in a tow body, whose outline dimensions are illustrated in Figure 1.1. The principal characteristics of the source are listed in Table 1.

After 160 hours of nearly non-stop operation in the laboratory, the source was taken to NUSC's calibration facility at Seneca Lake where an additional 130 hours of operating time was accumulated. The only service required on the source during this total running time was a filter change at 135 hours. This report summarizes the results of the Seneca Lake calibration.

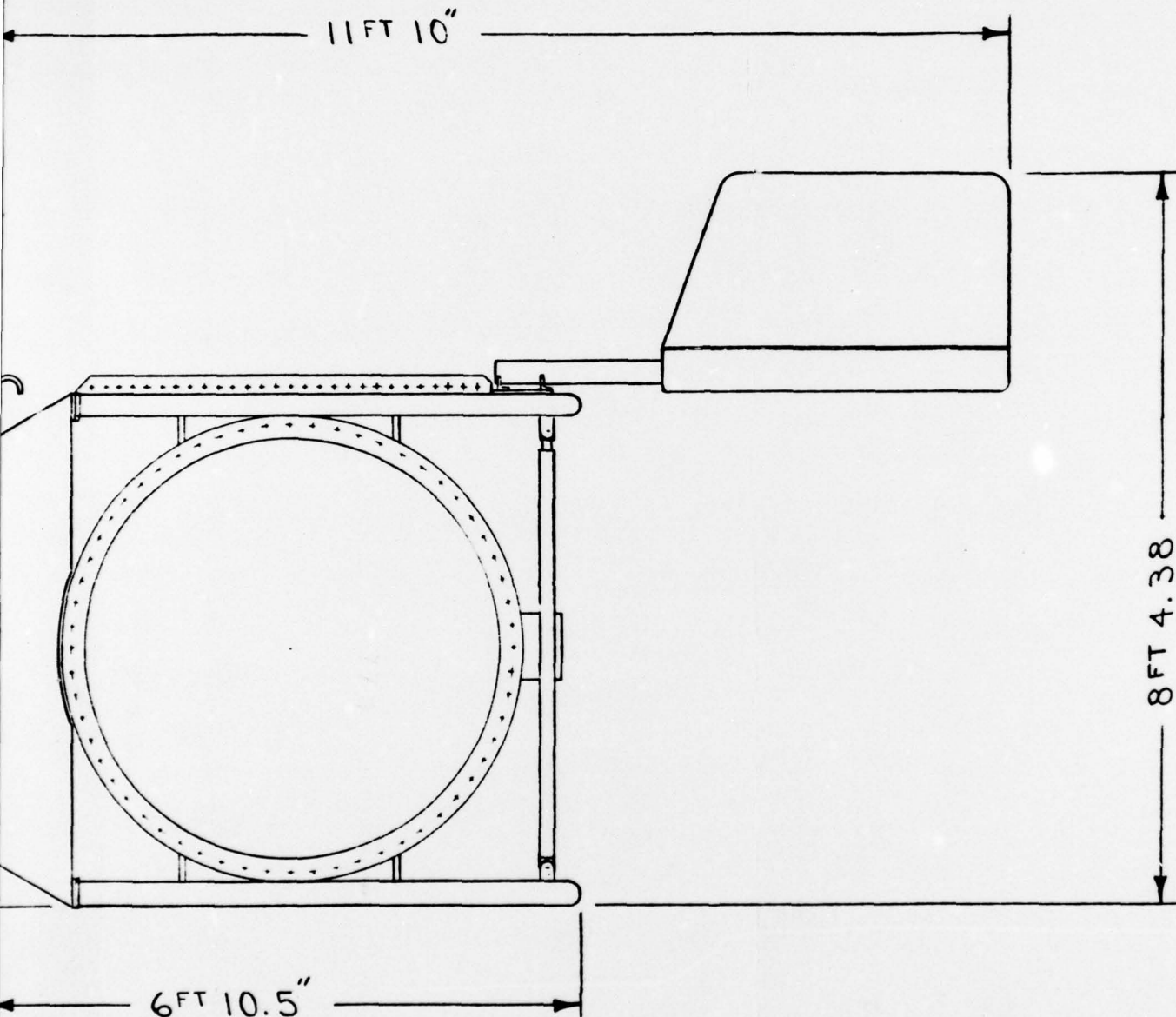
→ The source includes its own 30-hp hydraulic power supply as well as instrumentation to monitor source level, radiator acceleration (a signal output monitor), sea water temperature, depth, pitch and roll. Additional performance and diagnostic monitoring functions, including supply pressure, oil flow, main stage pressure, first stage pressure, internal pressure, oil temperature, motor temperature, filter condition and leak indicator are also provided. ←

ADDITIONAL	
DATE	TIME
BY	FOR
CHARACTERISTICS	REMARKS
<i>File on file</i>	
DISTRIBUTION/AVAILABILITY CODES	
Dist.	AVAIL. and/or SPECIAL
A	23



COMMERCIAL TOLERANCES GOVERN MATERIAL STOCK SIZE. FOR MFG TOLERANCES INCLUDING ROUND PUNCHED AND DRILLED HOLES SEE 52000		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES (FRACTIONS) XX DEC XXX DEC ± ± MATERIAL	
		UNREL	REL ENGRG R
NEXT ASSY	USED ON	X	
APPLICATION			

Report No. HA 105-78



ES GOVERN		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		CONTRACT NO.		<b>HYDROACOUSTICS INC.</b> 321 NORTHLAND AVE. P.O. BOX 3818 ROCHESTER, N Y 14610	
INCLUDING RILLED		TOLERANCES ON		DRAWN <i>W. Hovey, Mar 18, 1977</i>			
		XX DEC	XXX DEC	ANGLES	CHECKED		Figure 1. HVLF-1 Towbody Outline
		±	±	±	ENGINEER		
		MATERIAL			DESIGN ACTIVITY APPROVAL		SIZE <b>B</b>
		UNREL	REL ENGRG	REL FINAL			CODE IDENT NO.
SED ON		<b>X</b>					DRAWING NO. <b>2117B53306</b>
ON					SCALE <b>3/64</b>		1-2 SHEET <b>2</b>

Table 1  
HVLf-1 Parameters

Source Level, dB re 1 uPa @ 1 m	182
Frequency Range, Hz	8-32
Weight, with Tow Body (in Air) lb	5000
Weight, with Tow Body (in Water) lb	2400
Maximum Operating Depth (Uncompensated) ft	300
Input Power, 460 V, 3 $\phi$ , 60 Hz	30 kW

## 2.0 CALIBRATION RESULTS

### 2.1 RESPONSE

Figure 2.1 illustrates frequency response data from 6 to 60 Hz at six different drive levels, +3, 0, -6, -12, -18, and -24 dBV. Note that although the source saturates near 0 dBV drive, its response is quite linear below that level over most of the band. Figure 2.2 illustrates the response to a one-volt rms input signal to 200 Hz.

Figure 2.3 is a repeat of Figure 2.1 at the one-volt drive level except that the Monitor Hydrophone (displaced -10 dB) and accelerometer outputs are also plotted. Note that both monitor signals are in excellent agreement with the far-field hydrophone data.

Figure 2.4 repeats the accelerometer data of Figure 2.3 and adds the acoustic pressures within the source; main stage pressure is the pressure driving the radiators, and the first stage pressure is the acoustic pressure driving the main stage valve. The reason for the saturation between 18 and 30 Hz is apparent in Figure 2.4 since the main stage pressure is seen to approach a 1050-psi peak which is a modulation coefficient of the main stage hydroacoustic amplifier of 100%.

### 2.2 DIRECTIVITY

Figures 2.5 through 2.7 are polar patterns in the horizontal plane at 10, 20, and 100 Hz. No significant deviation from omnidirectionality is apparent in these frequency ranges.

SENECA LAKE  
 DATE 1-27-78  
 TIME 1300  
 TEMP 40° F  
 DEPTH 305 ft

SOURCE LEVEL RESPONSE

UNIT HVLF-1 SN 1

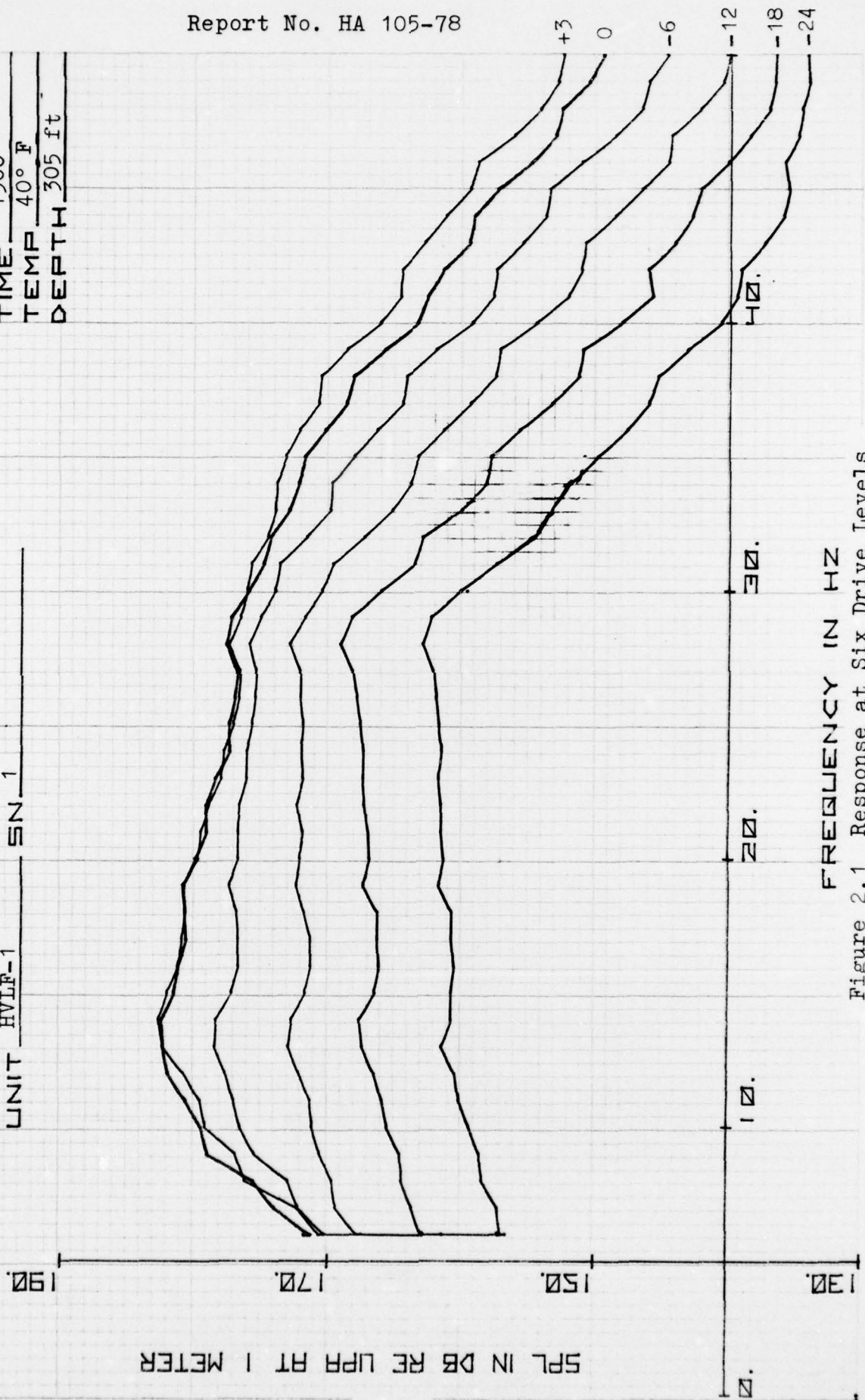
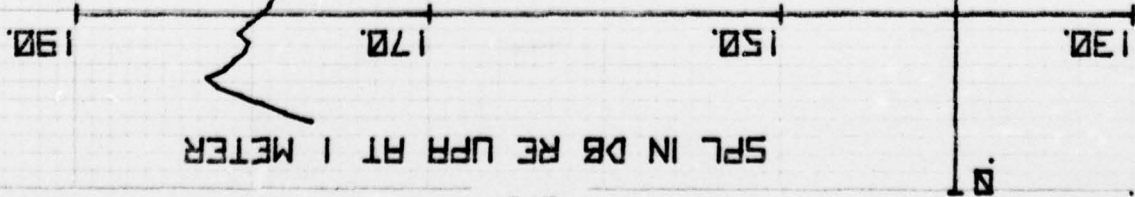


Figure 2.1 Response at Six Drive Levels

SENECA LAKE  
 DATE 1-27-78  
 TIME 1150  
 TEMP 40° F  
 DEPTH 300 ft

SOURCE LEVEL RESPONSE  
 UNIT HVLF-1 SN 1

SPL IN DB RE UPR AT 1 METER



FREQUENCY IN HZ

Figure 2.2 Wide Band Response at 1.0 V rms Drive

SENECA LAKE  
 DATE 1-27-78  
 TIME 1419  
 TEMP 40° F  
 DEPTH 300 ft

# SOURCE LEVEL RESPONSE

UNIT HVL-1 SN 1

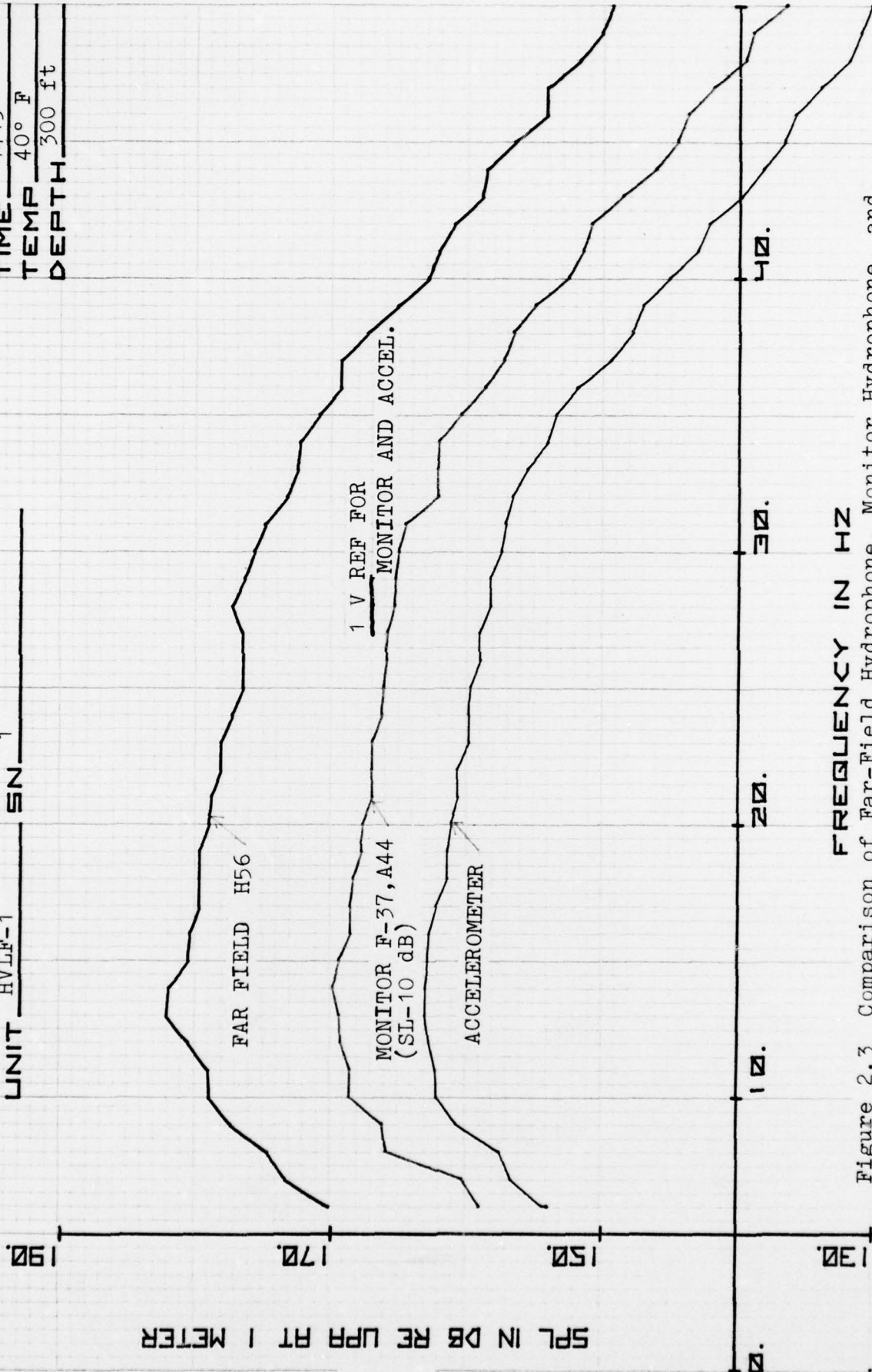


Figure 2.3 Comparison of Far-Field Hydrophone, Monitor Hydrophone, and Accelerometer Monitor

SENECA LAKE  
 DATE 1-27-78  
 TIME 1430  
 TEMP 40° F  
 DEPTH 305 ft

PRESSURE SIGNAL SCALE: 1 V = 1000 psi  
 ACCELEROMETER SCALE: 1 V = 1.37 g's

UNIT HVL-1 SN 1

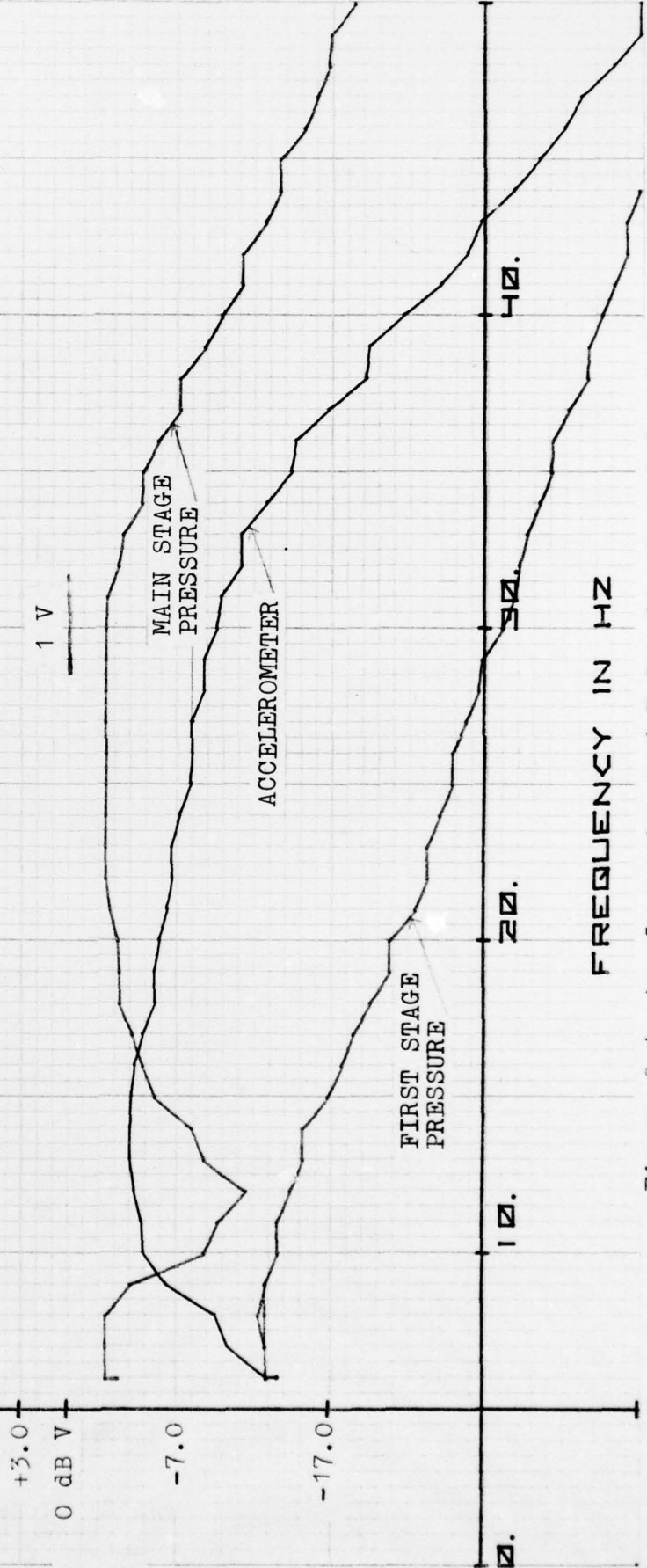
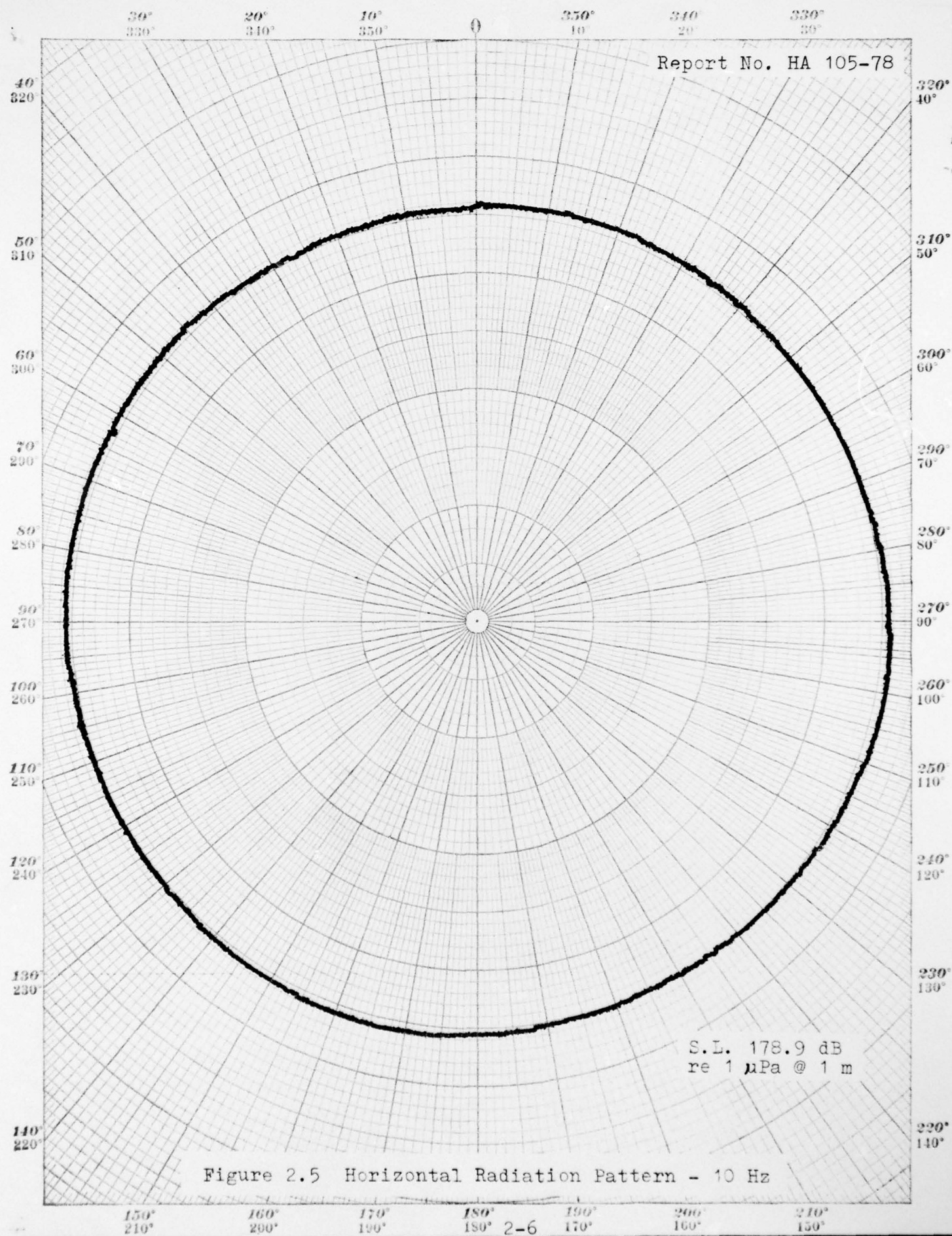
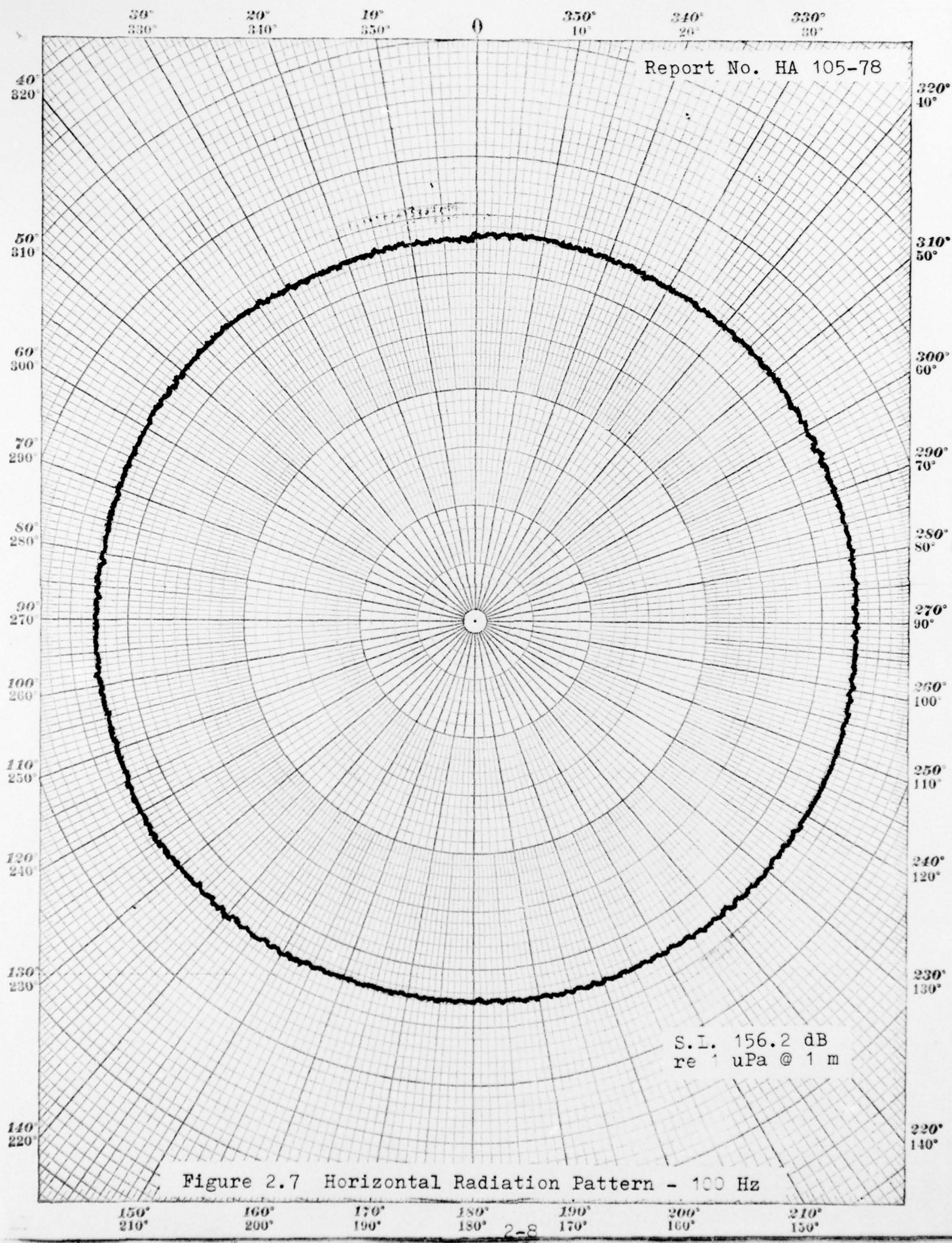


Figure 2.4 Accelerometer and Hydraulic Signal Levels







### 2.3 OUTPUT SPECTRA

Figures 2.8 through 2.21 are spectra of the source acoustic signal from 0 to 200 Hz taken in the far field. The spectra were collected from 6 to 32 Hz in two Hertz increments.

### 2.4 ADDITIONAL DATA

Mr. David Diehl of NRL collected cross correlation data of bi-phase and quadrature phase modulated signals of several bandwidths and center frequencies. The fidelity of transmission of these signals was generally excellent and will be reported separately by Mr. Diehl.

Additional point by point data were collected by Western Electric personnel and are included as Appendix A.

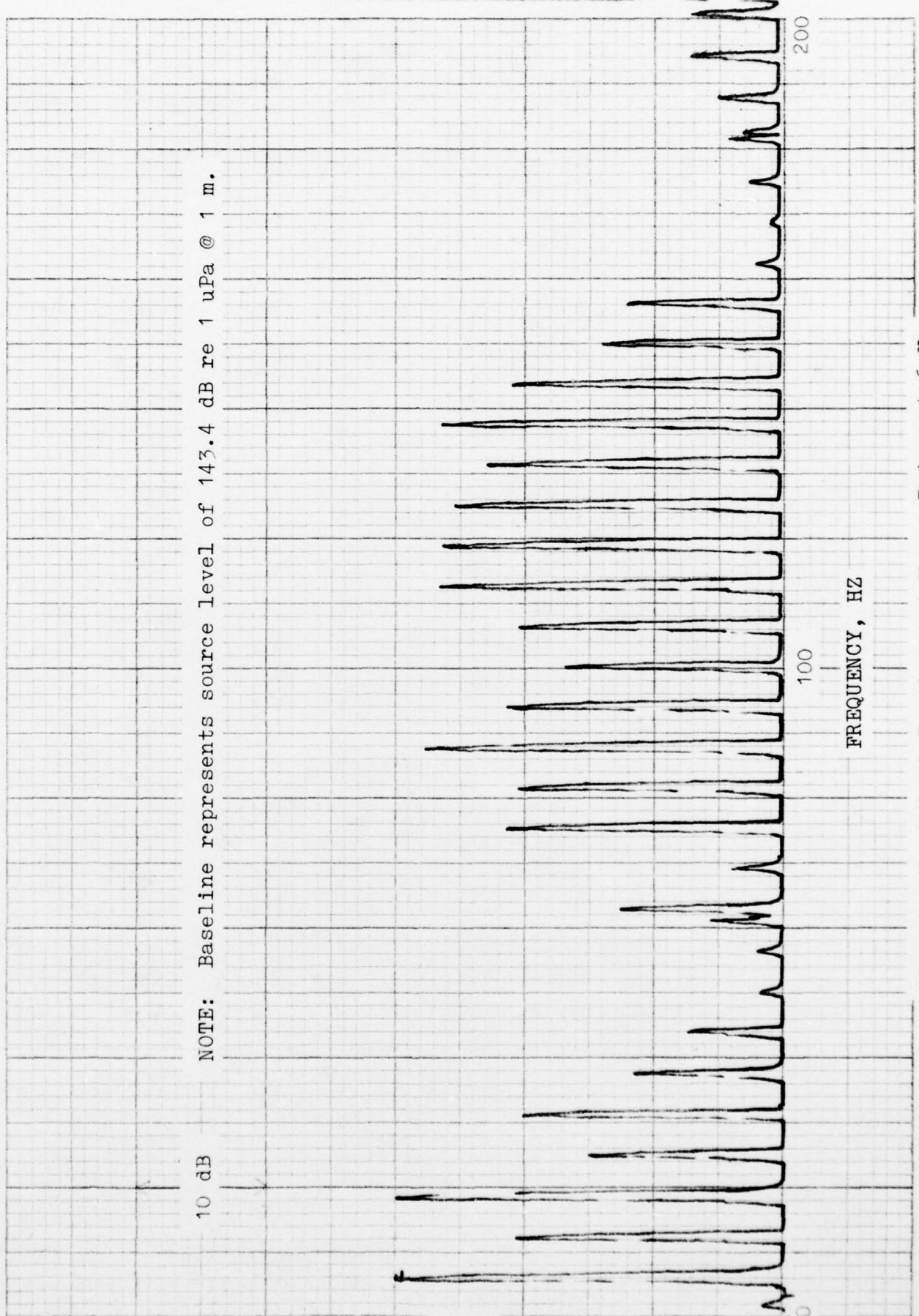


Figure 2.8 Output Spectrum, 1 V rms Drive at 6 Hz

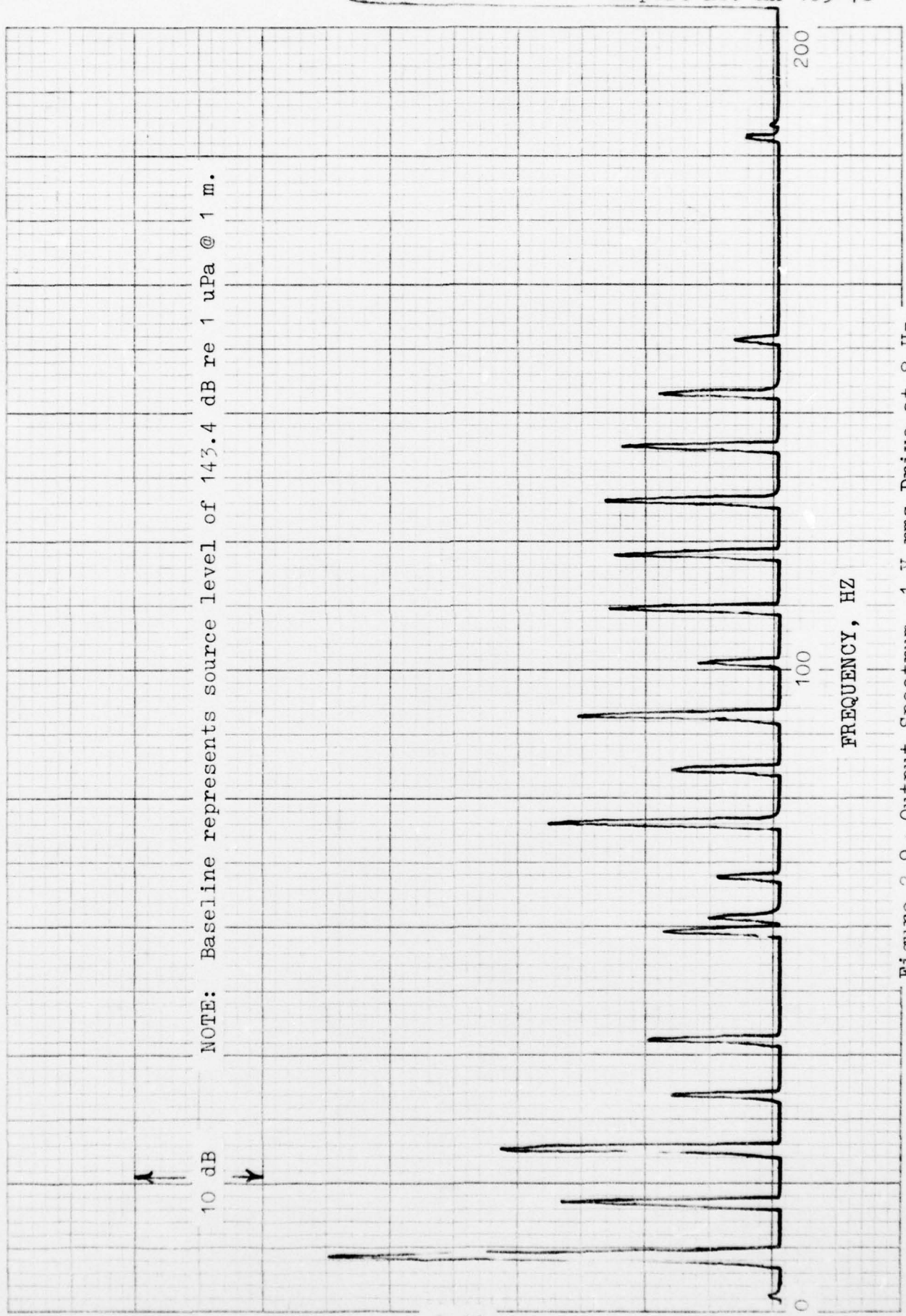


Figure 2.9. Output Spectrum, 1 V rms Drive at 8 Hz

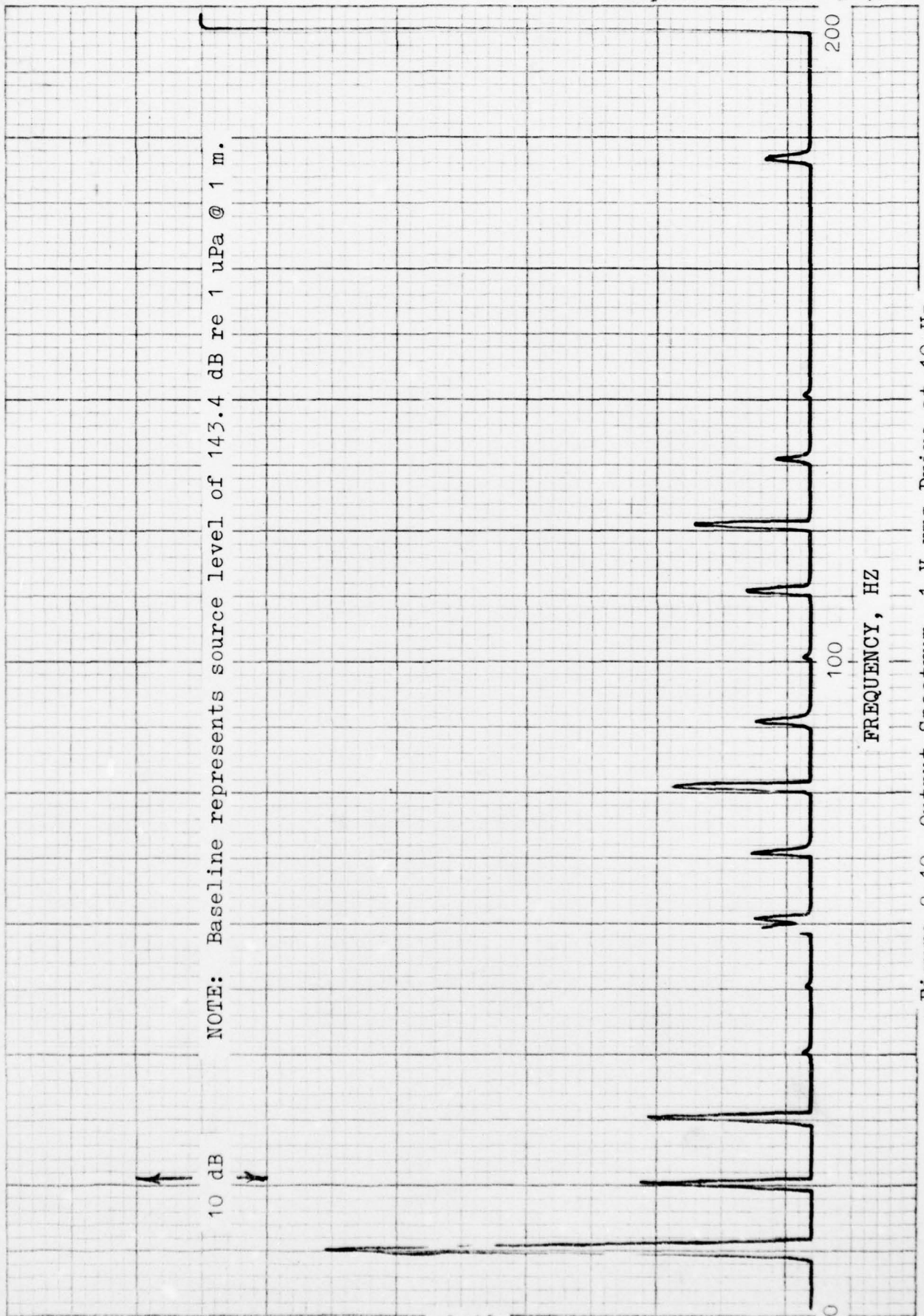


Figure 2.10 Output Spectrum, 1 V rms Drive at 10 Hz

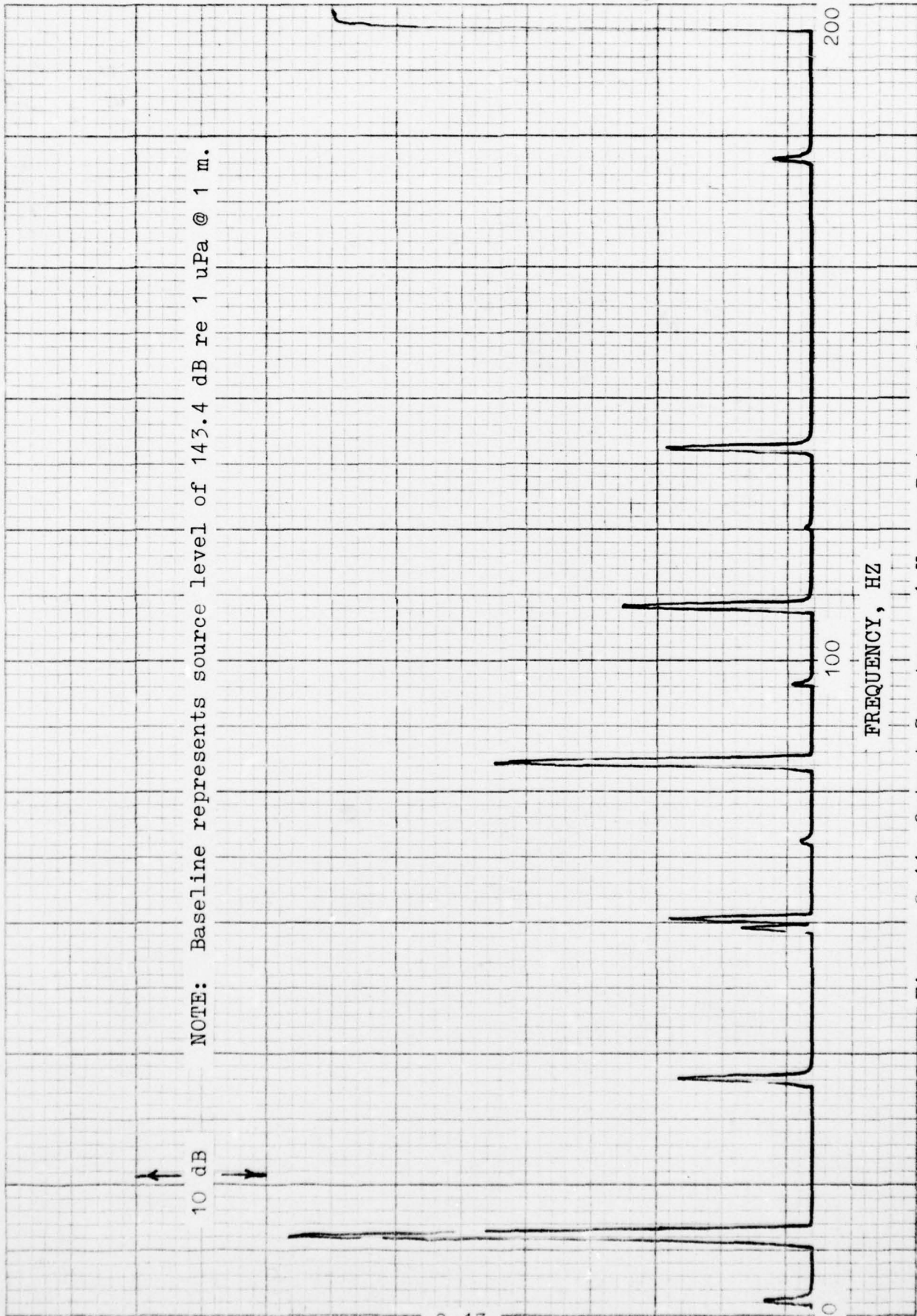


Figure 2.11 Output Spectrum, 1 V rms Drive at 12 Hz

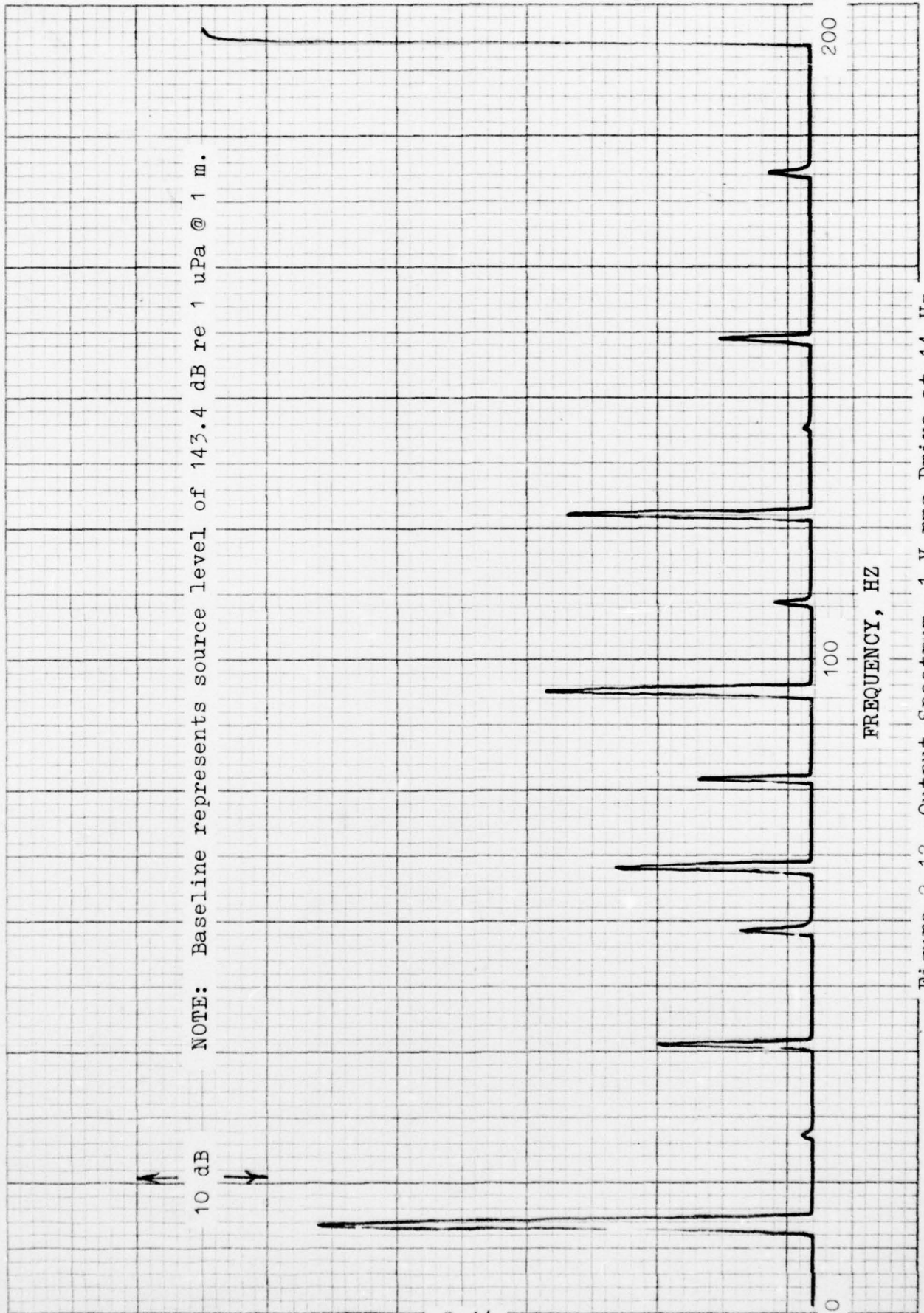


Figure 2.12 Output Spectrum, 1 V rms Drive at 14 Hz

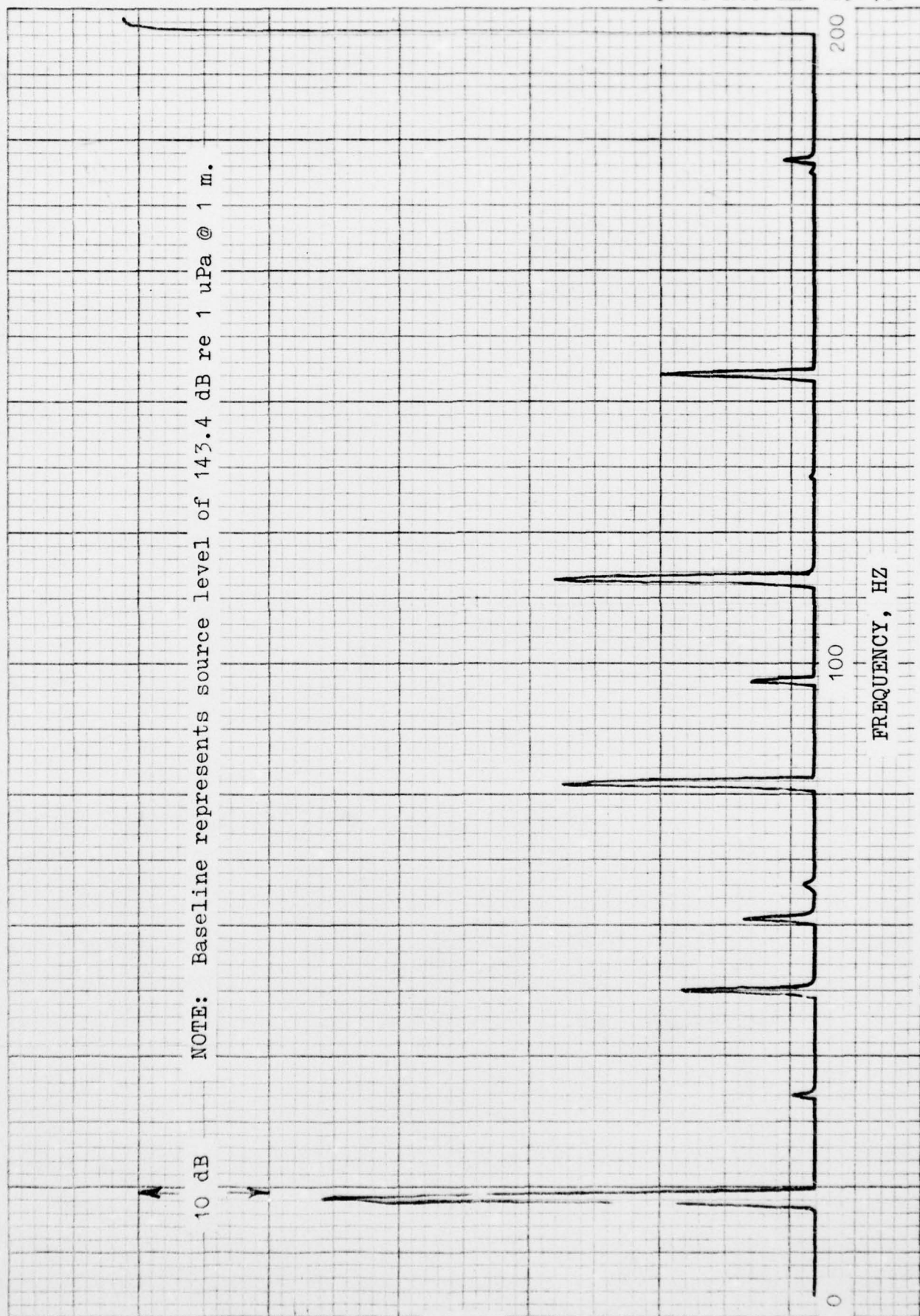


Figure 2.13 Output Spectrum, 1 V rms Drive at 16 Hz

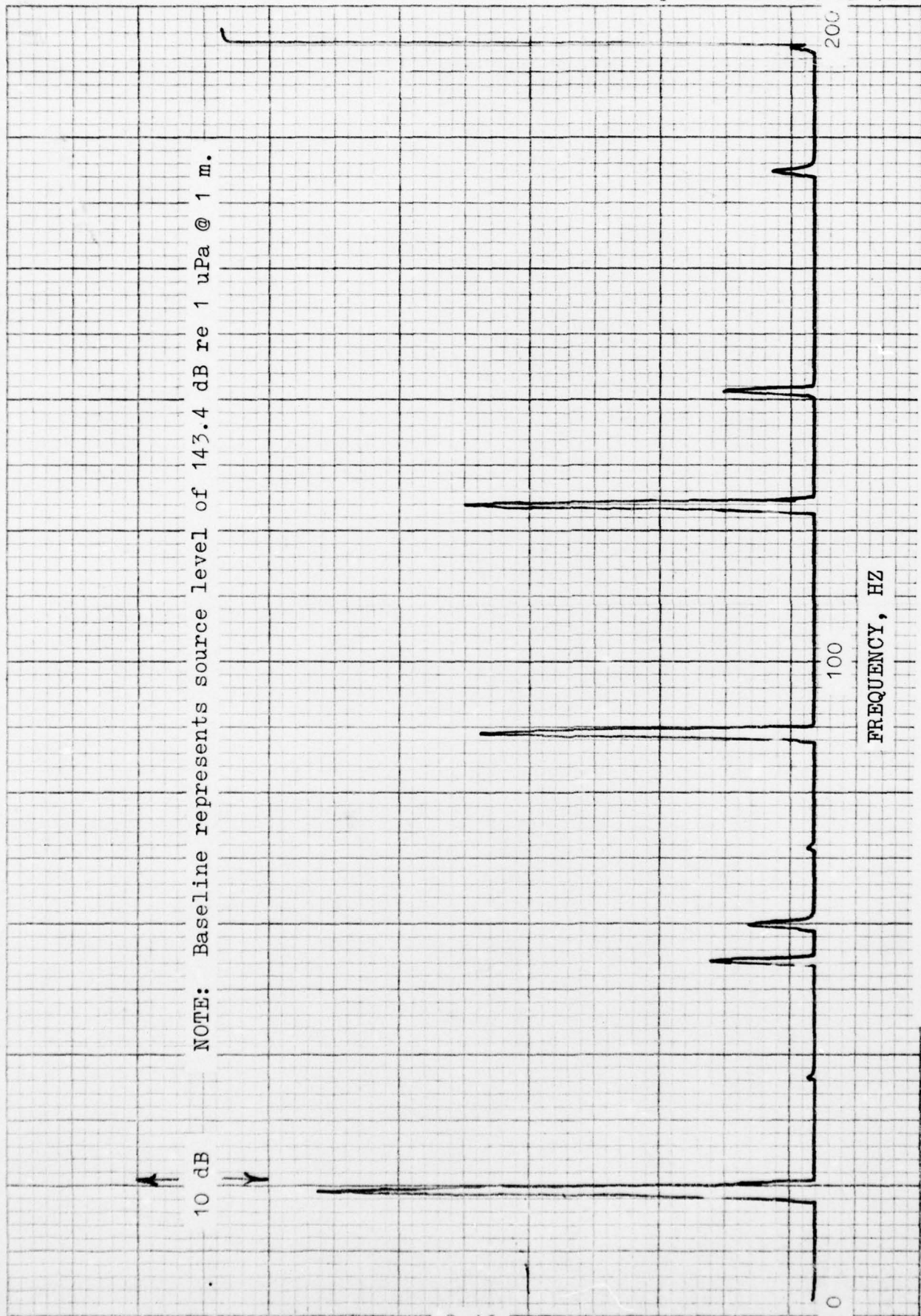


Figure 2.14 Output Spectrum, 1 V rms Drive at 18 Hz

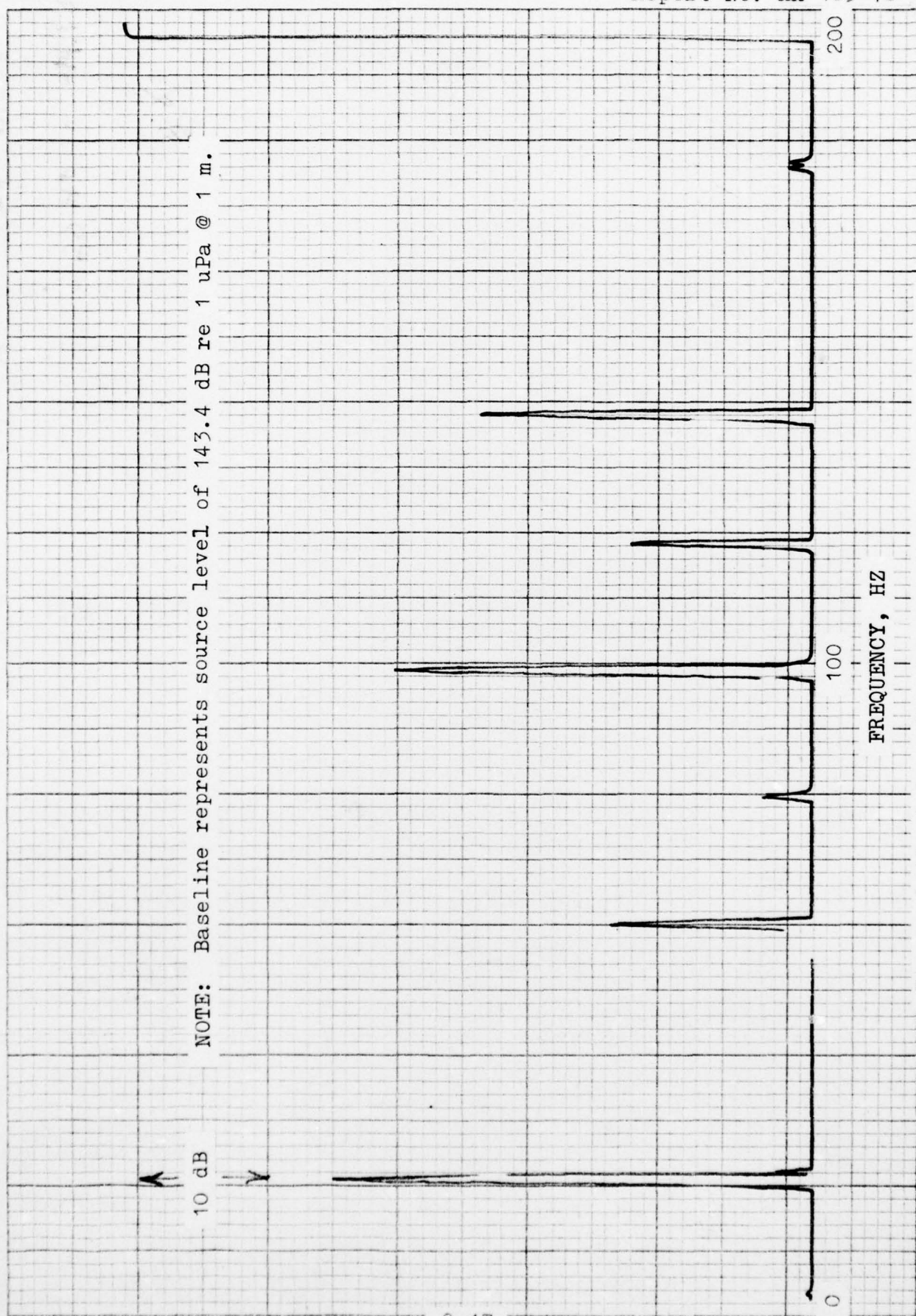


Figure 2.15 Output Spectrum, 1 V rms Drive at 20 Hz

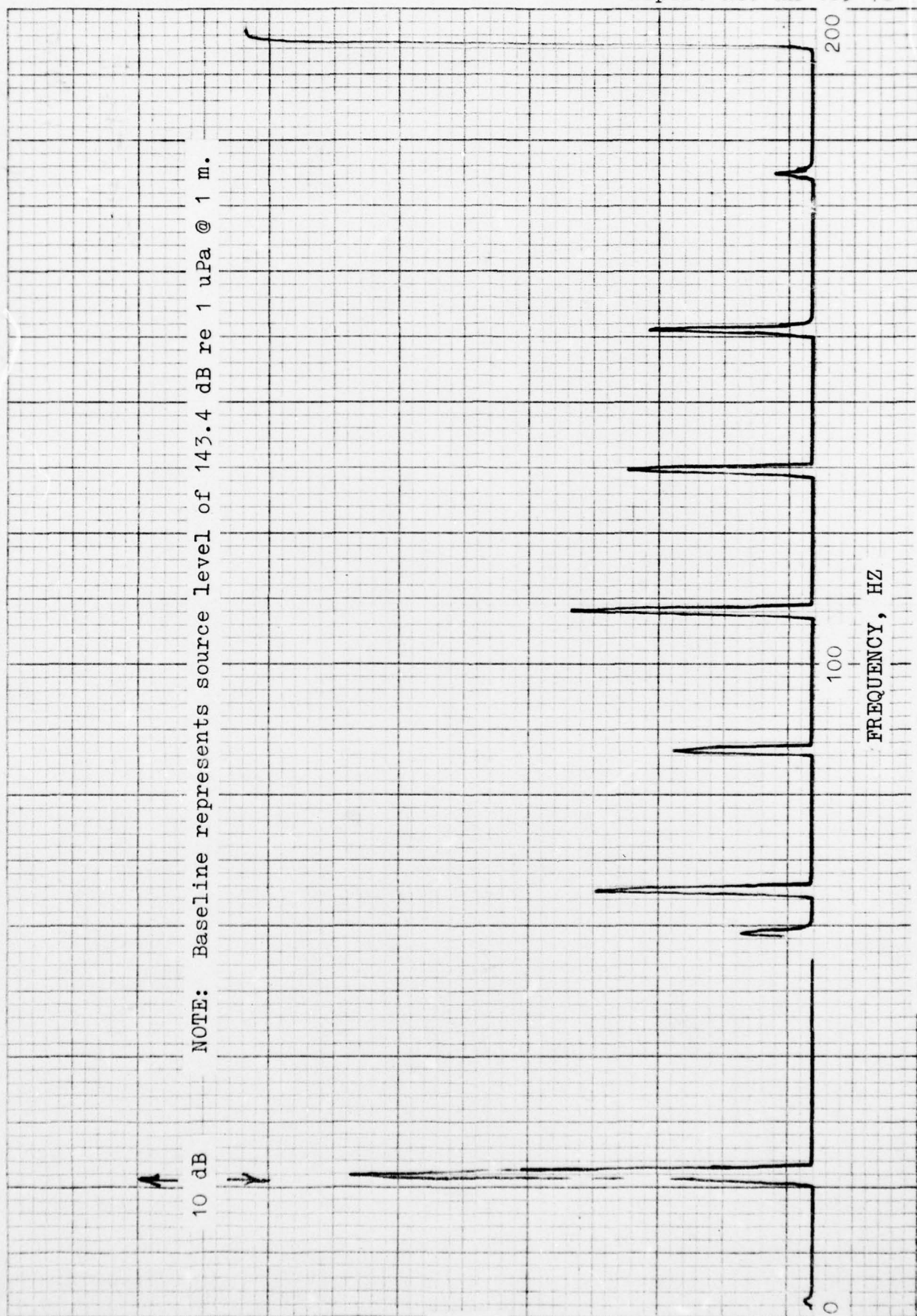


Figure 2.16 Output Spectrum, 1 V rms Drive at 22 Hz

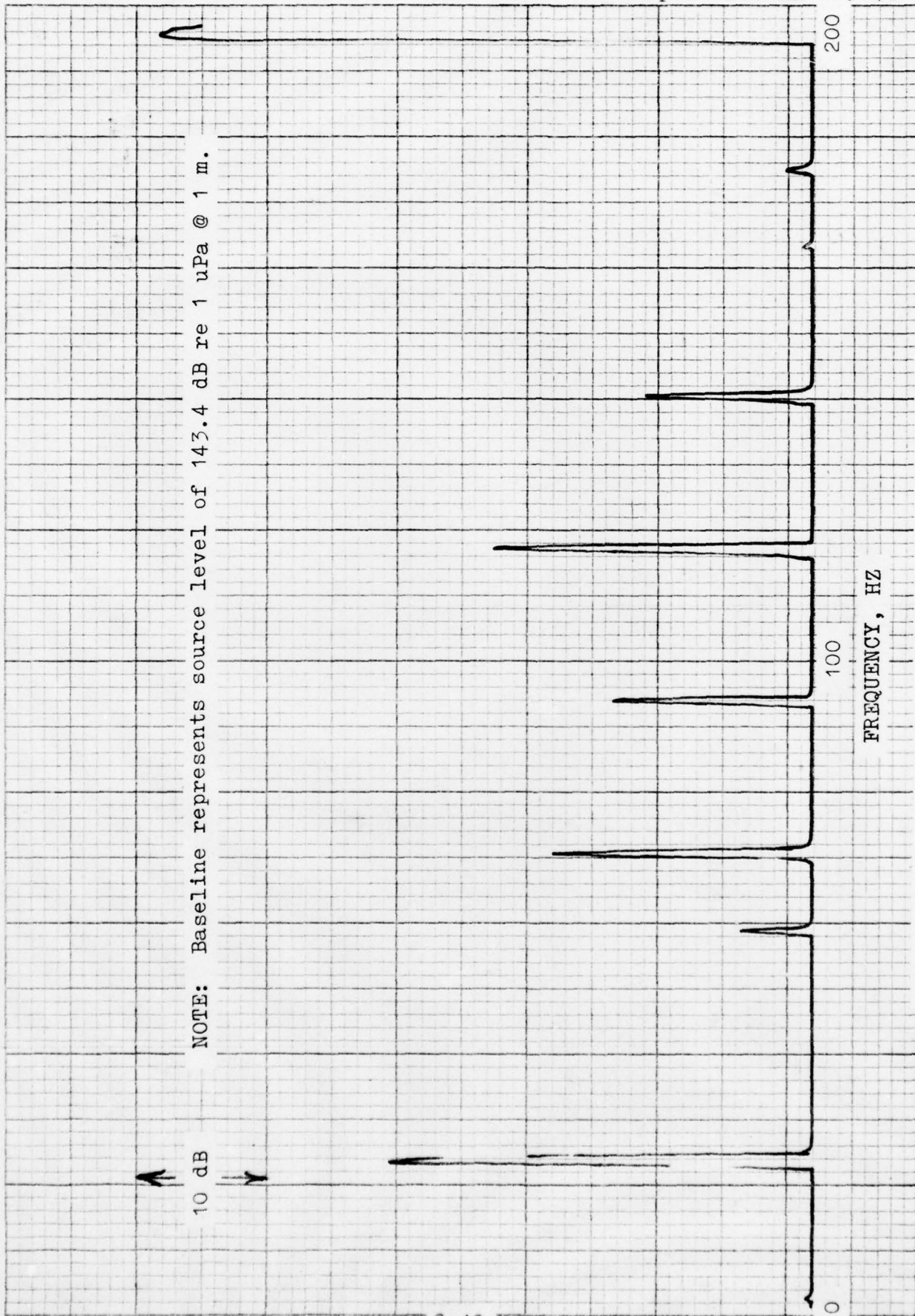


Figure 2.17 Output Spectrum, 1 V rms Drive at 24 Hz

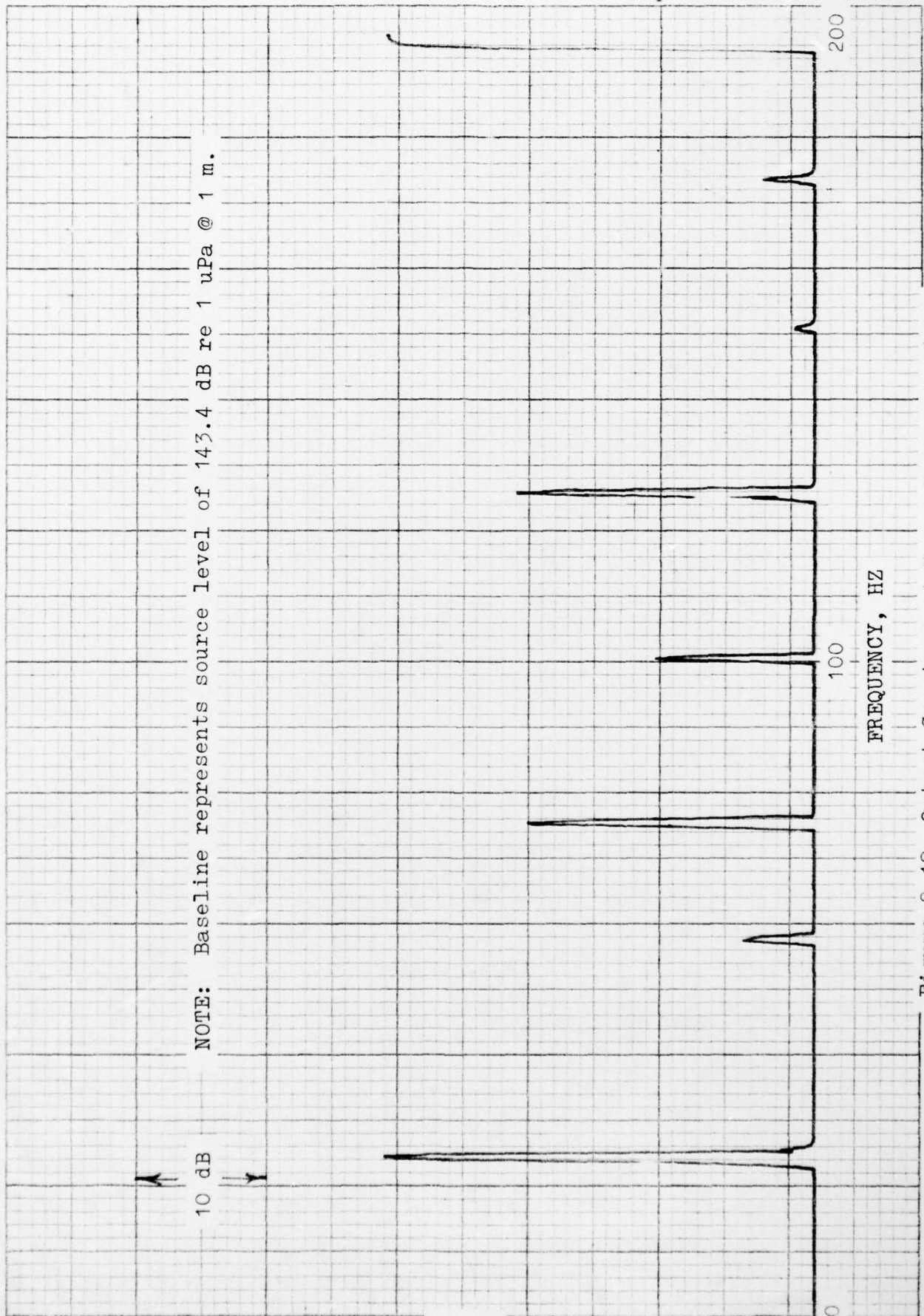


Figure 2.18 Output Spectrum, 1 V rms Drive at 26 Hz

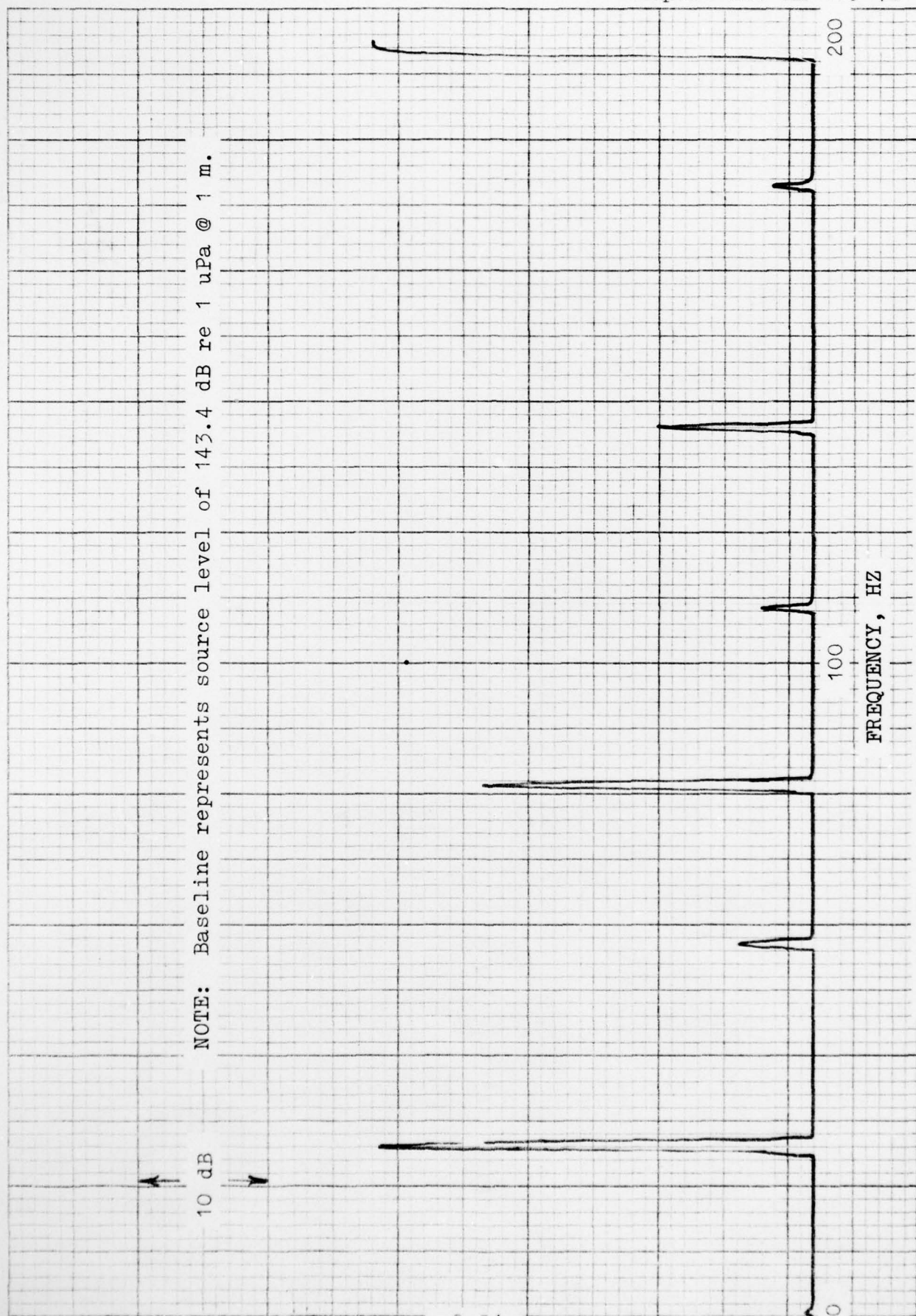


Figure 2.19 Output Spectrum, 1 V rms Drive at 28 Hz

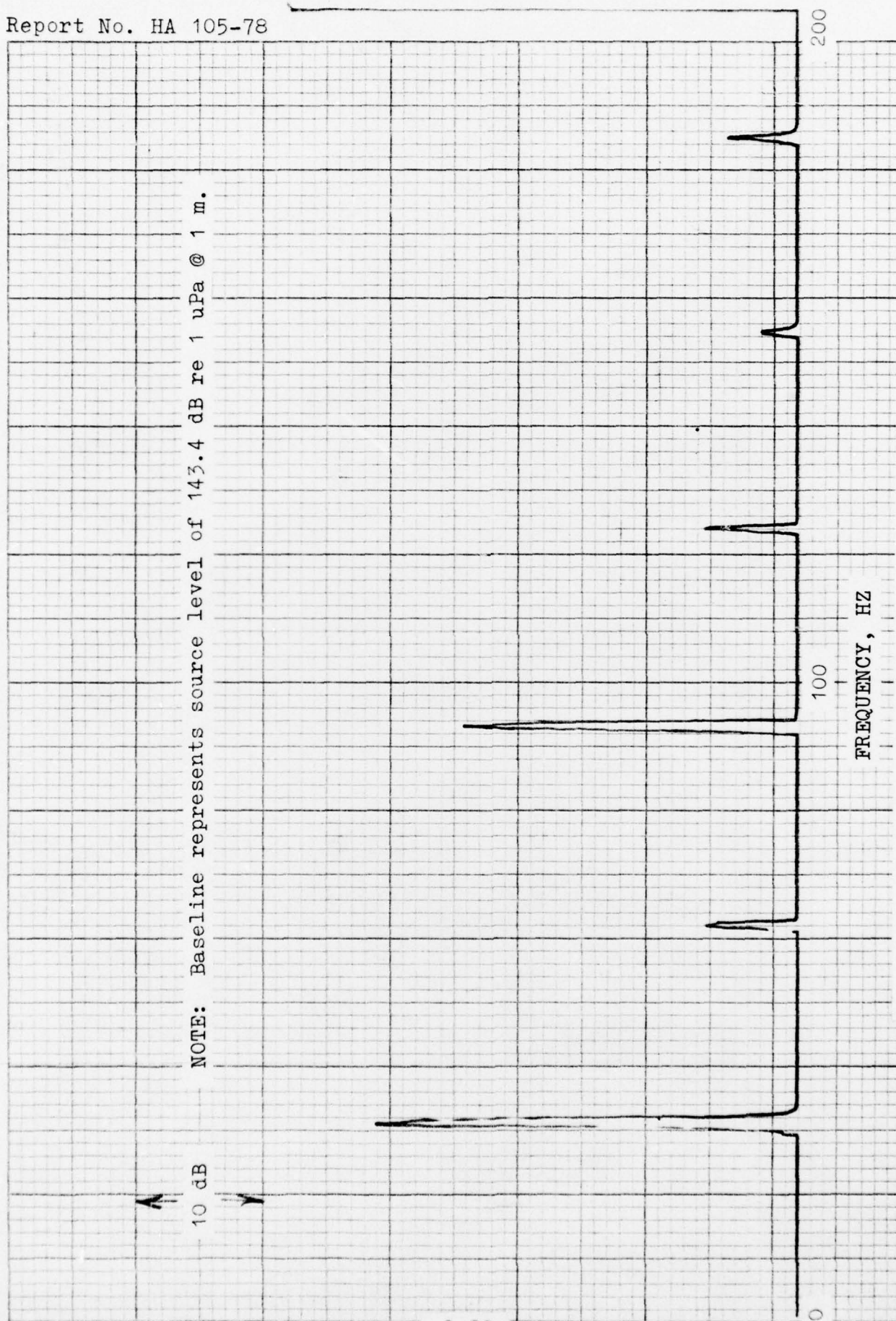
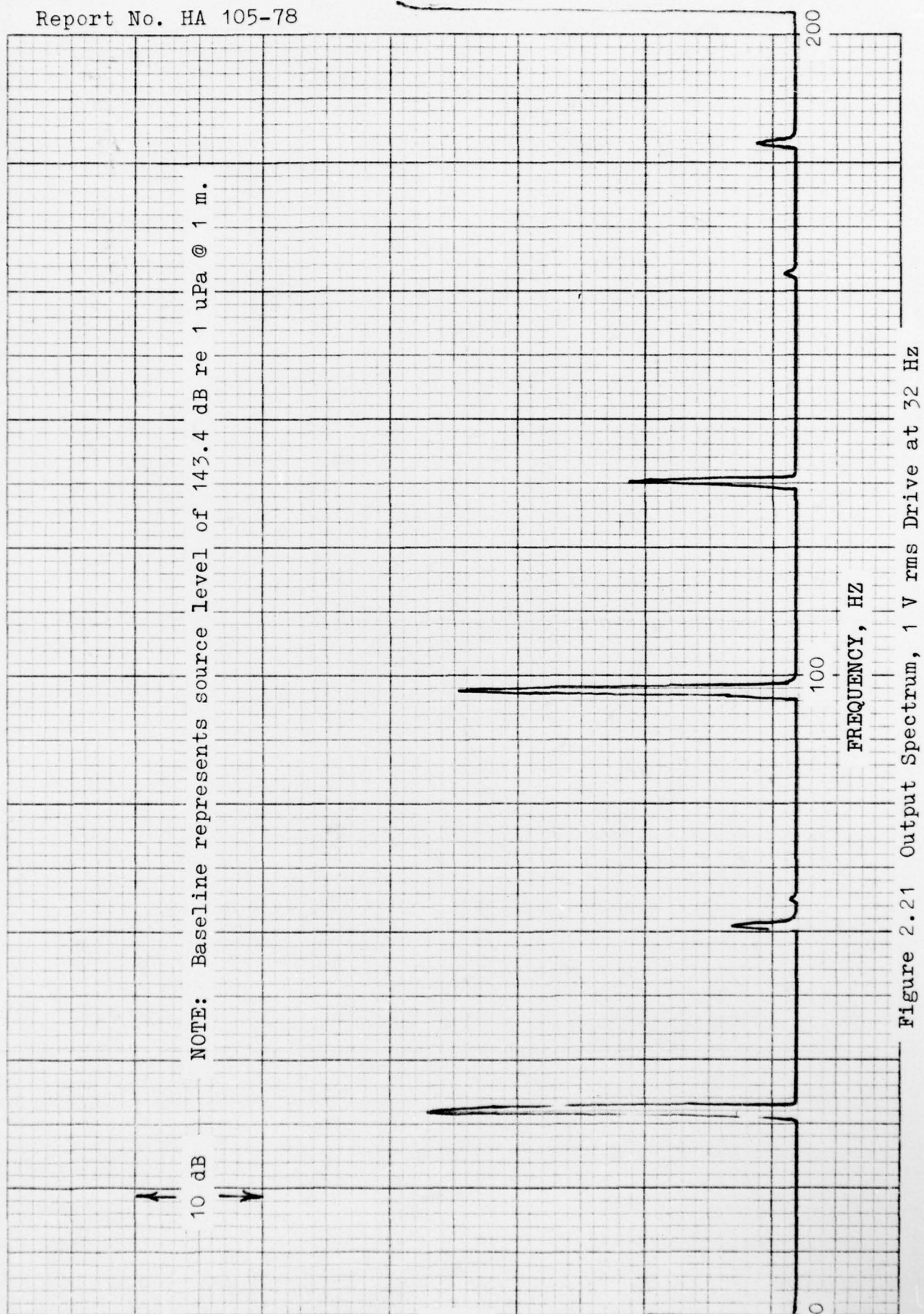


Figure 2.20 Output Spectrum, 1 V rms Drive at 30 Hz



APPENDIX A

ADDITIONAL HVLF-1

SENECA LAKE CALIBRATION DATA

DATE 1/31/78

SHEET 1 OF 10

BY B. T. Langherty

DRIVE (VRMS) 1.000

DC BIAS 458

PRECHARGE 41.9 g<sub>iso</sub>

ENV TEMP 51.9°C

MOTOR TEMP 49.2

WATER TEMP 23.8

ANALYZER CORRECTIONS

OFFSET 20dB

SYS. GAIN 30dB

MON HYDROPHONE

TYPE F-37

SENS -203.1

DIST

SPREAD LOSS 3.9dB

CORRECTED TERMINAL

SENS -177.0

CAL HYDROPHONE

TYPE H-56

SENS -171.8

DIST

SPREAD LOSS 21.6

CORRECTED TERMINAL

SENS -193.4

ACCELEROMETER

CORRECTION

FACTOR

TYPE ANALYZER

SD 335

S/N

TIME (EST)	FREQ (Hz)	NTR CUR (mA)	NTR (mA)	PUR SUP PUMP (psi)	PUR SUP PUMP (psi)	FIRST STAGE PRESSURE (psi)	MAIN STAGE PRESSURE (psi)	INPUT ATTEN (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDROPHONE (dBV)	ACCELEROMETER (dBV)	CAL HYDROPHONE (dBV)
1515	6.0	27.5	25	-	2106	1131	1005	30	-22.0	-11.3	-10.6	-18.0	-22.6	-33.5
	6.5										-9.9	-15.3	-20.0	-31.1
	7.0										-10.5	-14.2	-19.2	-29.9
	7.5										-9.9	-11.9	-17.0	-28.1
	8.0										-10.6	-11.5	-14.7	-27.4
	8.5										-9.9	-10.3	-15.7	-26.4
	9.0										-10.4	-10.2	-14.9	-26.2
	9.5										-9.9	-9.2	-14.7	-25.3
	10.0										-10.3	-9.2	-14.7	-25.0
	10.5										-10.0	-8.5	-13.9	-23.9
	11.0										-10.2	-8.2	-13.8	-23.5
	11.5										-10.0	-7.5	-13.3	-22.7
	12.0										-10.2	-7.4	-13.1	-22.2
	12.5										-10.0	-6.8	-12.6	-21.3
	13.0										-10.2	-7.0	-12.7	-21.7
	13.5										-10.0	-7.0	-12.6	-22.0
	14.0										-10.1	-7.3	-12.8	-22.6
	14.5										-10.0	-7.3	-12.9	-22.7
	15.0										-10.1	-7.7	-13.2	-23.3
	15.5										-10.0	-7.7	-13.3	-23.5
	16.0										-10.0	-7.9	-13.5	-23.8
	16.5										-10.0	-8.1	-13.7	-24.2
	17.0										-10.1	-8.4	-14.1	-24.2
	17.5										-10.1	-8.5	-14.2	-24.1
	18.0										-10.1	-8.7	-14.4	-23.8
	18.5										-10.0	-9.1	-14.7	-23.8
	19.0										-10.1	-9.2	-15.0	-24.4
	19.5										-10.1	-9.6	-15.3	-24.9
	20.0										-10.1	-9.5	-15.3	-24.8
	20.5										-10.2	-9.9	-15.8	-25.4
	21.0										-10.0	-9.9	-15.7	-25.3
	21.5										-10.3	-10.3	-16.2	-25.5
	22.0										-10.0	-10.3	-16.2	-25.5
	22.5										-10.3	-10.8	-16.6	-26.5
	23.0										-10.0	-10.7	-16.6	-26.5
	23.5										-10.3	-11.2	-17.0	-27.0
	24.0										-10.0	-11.0	-16.9	-27.1
	24.5										-10.3	-11.6	-17.5	-27.6
	25.0										-10.0	-11.4	-17.4	-27.5
	25.5										-10.3	-11.9	-18.0	-27.7

\* Input data entered unstable

DATE 1/31/78

SHEET 2 OF 4  
BY B. Daugherty

DRIVE (VRMS)

DC BIAS

PRECHARGE

OIL TEMP

MOTOR TEMP

WATER TEMP

ANALYZER CORRECTIONS

OFFSET

SYS. GAIN

ALCAJ HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

CAL HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

ACCELEROMETER

CORRECTION

FACTOR

TYPE ANALYZER

S/N

MONITOR PANEL					SPECTRUM ANALYZER (0.3 HZ BW)										
TIME	FREQ (Hz)	INTR CUR (uV)	WV INTR (uV/g)	PWR SUP FLOW (gpm)	PWR SUP PUMP PRESSURE (PSI)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTINGS (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDROPHONE (dBV)	ACCELEROMETER (dBV)	CAL HYDROPHONE (dBV)
1615	26.0								30			-10.0	-11.7	-17.8	-27.7
	26.5											-10.5	-12.3	-18.6	-28.3
	27.0											-10.0	-11.9	-18.3	-27.4
	27.5											-10.5	-12.5	-19.0	-27.1
	28.0											-10.0	-12.4	-18.7	-27.0
	28.5											-10.6	-13.1	-19.5	-27.9
	29.0											-10.0	-12.9	-19.2	-27.7
	29.5											-10.6	-13.4	-20.0	-28.6
	30.0	20.6	-5.0	-3.3	2181		1248	1032		-38.3	-12.4	-10.1	-13.1	-19.7	-28.6
	30.5			-5.5								-10.6	-13.8	-20.6	-29.7
	31.0											-10.1	-15.3	-20.5	-29.8
	31.5											-10.6	-16.0	-21.6	-30.2
	32.0											-10.1	-15.7	-21.4	-31.1
	32.5											-10.8	-16.6	-22.5	-32.2
	33.0											-10.1	-16.3	-22.4	-31.8
	33.5											-10.7	-17.4	-23.5	-32.8
	34.0											-10.1	-17.4	-23.4	-33.0
	34.5											-10.6	-18.5	-24.6	-33.9
	35.0	20.6	-10	-5.6	2175		1248	1038	30	-42.1	-15.3	-10.1	-18.6	-24.9	-33.9
	35.5			-7.7					20	0dB =	Vars	+0.1	-9.6	-16.1	-24.9
	36.0											0.1	-11.1	-17.7	-26.2
	36.5											0.1	-12.2	-19.4	-27.8
	37.0											0.1	-14.0	-21.3	-29.7
	37.5											0.1	-15.5	-22.8	-32.1
	38.0											0.1	-23.3	-31.1	-38.3
	38.5											0.2	-31.7	-38.8	-45.5
	39.0											0.2	-27.4	-36.6	-44.1
	39.5											0.2	-27.0	-25.1	-40.3
	40.0	20.4	-18	+2.3	2180		1240	1028		-35.1	-9.7	0.3	-24.4	-38.0	-41.4
	40.5			0.0								0.3	-23.8	-36.5	-39.7
	41.0											0.2	-22.8	-36.5	-38.0
	41.5											0.2	-21.8	-36.5	-35.6
	42.0											0.2	-20.4	-40.1	-34.7
	42.5											+0.1	-18.5	-38.0	-37.0
	43.0											-0.1	-19.9	-41.0	-38.6
	43.5											-0.5	-23.3	-38.2	-52.0
	44.0											-0.3	-38.1	-34.0	-49.0
	44.5											+0.2	-33.2	-30.5	-44.1
	45.0											+0.2	-27.2	-30.0	-41.2
	45.5											+0.2	-23.7	-30.0	-41.2
1710	120.0								20						

Band Width changed to 0.6 Hz BW

DATE 1/31/78  
SHEET 3 OF 10  
BY D. Kidd

DRIVE (VRMS) 1430  
DC BIAS 458  
PRECHARGE 40.3  
OIL TEMP 47.9  
MOTOR TEMP 36.4  
WATER TEMP 2.3

ANALYZER CORRECTIONS  
OFFSET 20dB  
SYS. GAIN 30dB

ALON HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

CAL HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

ACCELEROMETER  
CORRECTION  
FACTOR

TYPE ANALYZER  
S/N

MONITOR PANEL										SPECTRUM ANALYZER (0.3 HZ BW)					
TIME (EST)	FREQ (KHz)	MTR CUR (AMPS)	MTR INT (V)	PUR SUP PUMP FLOW (GPM)	PUR SUP PUMP PRESSURE (PSI)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDROPHONE (dBV)	ACCELEROMETER (dBV)	CAL HYDROPHONE (dBV)
1730	6.0														
↑	6.5														
	7.0														
	7.5														
	8.0														
	8.5														
	9.0														
	9.5														
1715	10.0	29.5	0.0	46.5	1686	920	1026	30	-23.3	-19.9	-7.4	-11.0	-16.4	-27.1	
1730	10.5			44.8								-6.9	-9.9	-15.3	-25.9
↓	11.0											-7.3	-9.9	-15.4	-25.9
	11.5											-6.9	-8.9	-14.5	-24.9
	12.0											-7.2	-9.0	-14.4	-24.8
	12.5											-6.9	-8.1	-13.6	-23.8
	13.0											-7.1	-7.9	-13.5	-23.4
	13.5											-7.1	-7.4	-13.4	-22.4
	14.0											-7.1	-7.0	-12.7	-21.8
	14.5											-7.0	-6.3	-12.2	-20.8
	15.0	29.7	41.5	46.6	2071	1118	1045		-25.0	-13.9	-7.1	-6.2	-12.1	-20.9	
	15.5			44.4								-6.9	-5.8	-11.6	-20.9
	16.0											-7.4	-6.3	-12.0	-21.8
	16.5											-6.9	-6.0	-11.7	-21.3
	17.0											-7.1	-6.3	-12.0	-21.9
	17.5											-7.0	-6.4	-12.0	-22.0
	18.0											-7.0	-6.6	-12.3	-22.6
	18.5											-7.0	-6.8	-12.5	-22.7
	19.0											-7.0	-7.1	-12.9	-23.1
	19.5											-7.0	-7.3	-13.1	-22.8
	20.0	22.4	-5	44.8	2144	1172	1035		-28.5	-11.6	-6.9	-8.2	-7.5	-13.4	-22.6
	20.5			42.4								-7.0	-7.8	-13.7	-22.7
	21.0											-7.1	-8.6	-14.4	-23.8
	21.5											-7.1	-8.6	-14.4	-23.8
	22.0											-7.0	-8.6	-14.6	-24.0
	22.5											-7.2	-9.1	-15.0	-24.6
	23.0											-7.2	-9.1	-15.1	-24.7
	23.5											-7.0	-9.4	-15.6	-24.5
	24.0											-7.2	-9.6	-15.7	-24.9
	24.5											-7.2	-10.1	-16.1	-26.0
	25.0	20.8	4.5	42.0	2171	1206	1041					-6.9	-10.1	-16.1	-25.9
1810	25.5			-0.2				30				-7.2	-10.5	-16.6	-26.6
												-7.0	-10.5	-16.5	-26.6
												-7.3	-11.1	-17.2	-27.3
												-7.0	-10.9	-17.0	-27.0
												-7.5	-11.5	-17.6	-27.5

\* UNSTABLE



DATE 1/31/78  
SHEET 5 OF 10  
BY B. Daugherty

DRIVE (VRMS) 2.000  
DC BIAS  
PRECHARGE  
OIL TEMP  
MOTOR TEMP  
WATER TEMP  
ANALYZER CORRECTIONS  
OFFSET  
SYS. GAIN

MON HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

CAL HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

ACCELEROMETER  
CORRECTION  
FACTOR

TYPE ANALYZER  
S/N

		MONITOR PANEL				SPECTRUM ANALYZER (0.3 HZ BW)							
TIME	FREQ (Hz)	PUR MTR CUR (uA)	PUR SUP PUMP FLOW (GPM)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
1850	30									-4.0	-12.2	-19.1	-27.8
	31									-4.1	-14.2	-19.6	-28.6
	32									-4.1	-14.2	-20.1	-29.6
	33									-4.1	-14.4	-20.7	-30.0
	34									-4.1	-14.8	-21.2	-30.6
	35									-4.1	-17.7	-21.2	-30.9
	36									-4.1	-16.6	-23.2	-32.0
	37									-4.1	-17.6	-24.2	-33.0
	38									-4.1	-18.6	-25.3	-34.2
	39									-4.1	-20.0	-26.7	-36.0
	40									-4.1	-21.2	-28.2	-38.3
	45									-4.1	-28.8	-35.5	-43.8
	50									-4.1	-37.6	-42.7	-51.0
	55									-4.0	-33.0	-39.9	-49.0
	60									-4.0	-31.6	-36.0	-45.0
	65									-3.9	-29.7	-37.7	-45.5
	70									-4.0	-27.7	-37.8	-43.5
	75									-4.0	-26.5	-37.1	-42.9
	80									-4.1	-25.3	-37.8	-41.7
	85									-4.1	-23.8	-36.8	-39.2
	90									-4.1	-22.1	-39.7	-38.6
	95									-4.4	-22.7	-39.0	-38.4
	100									-4.9	-24.9	-42.7	-40.2
	105									-4.6	-38.7	-41.2	-51.9
	110									-4.0	-36.2	-37.8	-51.8
	35												
	40												
	45												
	50												
	55												
	60												
	65												
	70												
	75												
	80												
	85												
	90												
	95												
	100												
	105												

DATE 1/31/78  
SHEET 6 OF 10  
BY T. D. G. S. J. J.

DRIVE (VRMS) 0.500  
DC BIAS  
FREQUENCY  
OIL TEMP  
MOTOR TEMP  
WATER TEMP

ANALYZER CORRECTIONS  
OFFSET  
SYS. GAIN

MON HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

CAL HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

ACCELEROMETER  
CORRECTION  
FACTOR

TYPE ANALYZER  
S/N

		MONITOR PANEL				SPECTRUM ANALYZER (0.3 HZ BW)							
TIME	FREQ (Hz)	PUR MTR (uA)	PUR SUP PUMP FLOW (GPM)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT STAGE (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDROPHONE (dBV)	ACCELEROMETER (dBV)	CAL HYDROPHONE (dBV)
	6.0									-16.6	-15.6	-23.1	-34.3
	7.0									-16.5	-15.2	-20.4	-31.2
	8.0									-16.4	-13.1	-18.6	-29.7
	9.0									-16.3	-12.2	-17.9	-28.2
	10.0									-16.3	-11.8	-17.4	-27.7
	11.0									-16.2	-11.6	-17.2	-27.1
	12.0									-16.2	-11.4	-17.2	-26.5
	13.0									-16.2	-11.7	-17.4	-26.3
	14.0									-16.3	-11.8	-17.4	-27.1
	15.0									-16.1	-12.1	-17.6	-27.6
	16.0									-16.0	-11.9	-17.6	-27.9
	17.0									-16.1	-12.2	-17.8	-28.2
	18.0									-16.1	-12.3	-18.0	-28.3
	19.0									-16.1	-12.1	-18.1	-27.6
	20.0									-16.0	-12.4	-18.2	-27.7
	21.0									-16.0	-12.1	-18.3	-27.9
	22.0									-16.0	-12.4	-18.5	-28.4
	23.0									-16.0	-12.4	-18.6	-28.9
	24.0									-16.0	-12.3	-18.7	-29.2
	25.0									-16.0	-12.3	-18.9	-29.3
	26.0									-16.0	-12.1	-19.2	-29.4
	27.0									-16.0	-12.4	-19.4	-29.5
	28.0									-16.0	-12.3	-19.6	-29.6
	29.0									-16.0	-12.1	-19.8	-29.7
	30.0									-16.0	-12.4	-20.1	-30.0
	31.0									-16.1	-12.1	-20.3	-30.2
	32.0									-16.1	-12.3	-20.5	-30.4
	33.0									-16.1	-12.1	-20.7	-30.6
	34.0									-16.1	-12.0	-20.9	-30.8
1950	35.0									-16.1	-12.5	-21.1	-31.2
										-16.1	-12.2	-21.3	-31.4
										-16.1	-12.5	-21.5	-31.6
										-16.1	-12.2	-21.7	-31.8
										-16.1	-12.5	-21.9	-32.0
										-16.1	-12.2	-22.1	-32.2
										-16.1	-12.5	-22.3	-32.4
										-16.1	-12.2	-22.5	-32.6
										-16.1	-12.5	-22.7	-32.8
										-16.1	-12.2	-22.9	-33.0
										-16.1	-12.5	-23.1	-33.2
										-16.1	-12.2	-23.3	-33.4
										-16.1	-12.5	-23.5	-33.6
										-16.1	-12.2	-23.7	-33.8
										-16.1	-12.5	-23.9	-34.0
										-16.1	-12.2	-24.1	-34.2
										-16.1	-12.5	-24.3	-34.4
										-16.1	-12.2	-24.5	-34.6
										-16.1	-12.5	-24.7	-34.8
										-16.1	-12.2	-24.9	-35.0

DATE 1/11/78  
SHEET 7 OF 10  
BY D.A. KIDD

DRIVE (VRMS) 2250

DC BIAS

PRECHARGE

OIL TEMP

MOTOR TEMP

WATER TEMP

ANALYZER CORRECTIONS  
OFFSET  
SYS. GAIN

MON HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

CAL HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL  
SENS

ACCELEROMETER

CORRECTION

FACTOR

TYPE ANALYZER

S/N

		MONITOR PANEL					SPECTRUM ANALYZER (0.3 HZ BW)							
TIME	FREQ (Hz)	MTR CUR (AMPS)	MTR (VOLTS)	PUR SUP PUMP FLOW (GPM)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDROPHONE (dBV)	ACCELEROMETER (dBV)	CAL HYDROPHONE (dBV)
1950	6.0							30			-22.3	-20.8	-25.6	-36.4
	7.0										-22.2	-18.7	-24.3	-34.7
	8.0										-22.1	-17.7	-23.5	-34.0
	9.0										-22.0	-17.1	-22.7	-33.4
	10.0										-22.0	-17.0	-22.4	-32.5
	11.0										-21.9	-16.5	-22.1	-31.8
	12.0										-21.9	-16.4	-22.1	-31.2
	13.0										-21.9	-16.5	-22.2	-31.0
	14.0										-22.3	-16.7	-22.4	-32.0
	15.0										-21.9	-16.7	-22.1	-32.2
	16.0										-21.6	-16.6	-22.4	-32.7
	17.0										-21.7	-16.6	-22.3	-32.6
	18.0										-21.7	-16.5	-22.4	-31.6
	19.0										-21.8	-16.6	-22.4	-32.0
	20.0										-21.7	-16.6	-22.3	-32.1
	21.0										-21.7	-16.5	-22.4	-32.2
	22.0										-21.7	-16.4	-22.3	-31.8
	23.0										-21.7	-16.3	-22.2	-32.2
	24.0										-21.7	-16.3	-22.2	-32.6
	25.0										-21.6	-16.3	-22.1	-32.5
	26.0										-21.7	-16.4	-22.3	-32.6
	27.0										-21.7	-16.4	-22.6	-32.0
	28.0										-21.7	-17.1	-23.3	-31.7
	29.0										-21.7	-18.0	-24.1	-33.0
	30.0										-21.8	-18.6	-25.3	-34.3
	31.0										-21.7	-21.7	-27.0	-36.2
	32.0										-21.7	-23.0	-28.6	-38.4
	33.0										-21.8	-24.1	-30.1	-39.9
	34.0										-21.8	-25.7	-31.4	-41.6
2010	35.0							30			-21.8	-27.4	-33.2	-42.9

\* UNSTABLE

245 = 3.16 V/m

DATE 1-31-76/2-1-78 SHEET 8 OF 10 BY D.A. KIDD			MONITOR PANEL					SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (Hz)	MR (uA)	MR (uA)	PUR SUP PUMP PRESSURE (PSI)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTINGS (dB)	FIRST STAGE (dB)	MAIN STAGE (dB)	DRIVE LEVEL (dB)	MON HYDRO- PHONE (dB)	ACCELER- OMETER (dB)	CAL HYDRO- PHONE (dB)
	6.0							30			-28.5	-26.0	-31.7	-41.4
	7.0										-28.5	-24.6	-29.9	-40.2
	8.0										-28.4	-23.6	-29.5	-40.5
	9.0										-28.3	-23.1	-28.6	-39.0
	10.0										-28.2	-22.9	-28.2	-39.1
	11.0										-28.2	-22.5	-28.2	-38.2
	12.0							30			-28.2	-22.4	-28.2	-37.6
0850	13.0							30			-28.2	-22.5	-27.8	-36.9
2030	14.0										-28.4	-22.7	-27.8	-38.6
	15.0										-28.2	-22.6	-27.6	-38.3
	16.0										-28.0	-22.5	-27.6	-38.7
	17.0										-28.1	-22.5	-28.0	-38.4
	18.0										-28.0	-22.3	-28.0	-37.5
	19.0										-28.0	-22.3	-27.8	-37.6
	20.0										-28.0	-22.3	-27.6	-37.8
	21.0										-28.1	-22.0	-27.5	-37.7
	22.0										-28.0	-21.9	-27.4	-37.4
	23.0										-28.0	-21.8	-27.2	-37.6
	24.0										-27.9	-21.5	-27.2	-37.8
	25.0										-28.0	-21.5	-27.3	-38.0
	26.0										-28.0	-21.4	-27.4	-37.9
	27.0										-27.9	-21.7	-27.8	-37.3
	28.0										-28.0	-22.5	-28.6	-37.5
	29.0										-28.0	-23.7	-29.6	-39.0
	30.0										-28.1	-24.8	-30.8	-40.6
	31.0										-28.0	-28.2	-32.4	-42.8
	32.0										-28.1	-29.4	-34.4	-45.4
	33.0										-28.0	-30.7	-35.6	-46.4
	34.0										-28.1	-32.6	-37.7	-48.4
2010	35.0							30			-28.0	-34.3	-39.8	-49.1
0820	36.0							30			-28.0	-23.2	-29.1	-38.3
DRIVE (VRMS) 0.105														
DC BIAS														
PRECHARGE														
OIL TEMP														
MOTOR TEMP														
WATER TEMP														
ANALYZER CORRECTIONS														
OFFSET														
SYS. GAIN														
MON HYDROPHONE														
TYPE														
SENS														
DIST														
SPREAD LOSS														
CORRECTED TERMINAL														
SENS														
CAL HYDROPHONE														
TYPE														
SENS														
DIST														
SPREAD LOSS														
CORRECTED TERMINAL														
SENS														
ACCELEROMETER														
CORRECTION														
FACTOR														
TYPE ANALYZER														
SN														

\* meter not accurate in this range

DATE 1-31-78/2-1-78  
SHEET 8 OF 10  
BY D.A. KIDD

DRIVE (VRMS) 0.105  
DC BIAS  
PRECHARGE  
OIL TEMP  
MOTOR TEMP  
WATER TEMP

ANALYZER CORRECTIONS  
OFFSET  
SYS. GAIN

MON HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

CAL HYDROPHONE  
TYPE  
SENS  
DIST  
SPREAD LOSS  
CORRECTED TERMINAL  
SENS

ACCELEROMETER  
CORRECTION  
FACTOR

TYPE ANALYZER  
F/N

DATE 2-1-78

SHEET 9 OF 10

BY D. A. KIDD

DRIVE (VRMS) .037

DC BIAS

PRECHARGE

OIL TEMP

MOTOR TEMP

WATER TEMP

ANALYZER CORRECTIONS

OFFSET

SYS. GAIN

MON HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

CAL HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

ACCELEROMETER

CORRECTION

FACTOR

TYPE ANALYZER

S/N

MONITOR PANEL				SPECTRUM ANALYZER (0.3 HZ BW)									
TIME	FREQ (Hz)	MTR CUR (uA)	Wtr SUP PUMP FLOW (GPM)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDROPHONE (dBV)	ACCELEROMETER (dBV)	CAL HYDROPHONE (dBV)
0900	6.0						20			-24.6	-22.1	-28.4	-38.0
	7.0									-24.4	-20.8	-26.0	-36.6
	8.0									-24.4	-19.9	-26.6	-36.4
	9.0									-24.3	-19.4	-26.6	-35.5
	10.0									-24.3	-19.3	-25.6	-35.0
	11.0									-24.2	-18.7	-25.9	-34.0
	12.0									-24.2	-18.5	-24.2	-33.7
	13.0									-24.2	-18.5	-23.7	-33.4
	14.0									-24.3	-18.8	-23.1	-34.0
	15.0									-24.1	-18.5	-23.1	-34.3
	16.0									-24.0	-18.6	-23.3	-34.0
	17.0									-24.1	-18.4	-23.0	-34.2
	18.0									-24.1	-18.3	-23.0	-33.3
	19.0									-24.0	-18.4	-23.1	-33.5
	20.0									-23.9	-18.3	-23.4	-33.9
	21.0									-24.0	-18.1	-23.2	-33.9
	22.0									-24.0	-18.2	-22.7	-33.9
	23.0									-24.0	-18.3	-23.0	-34.2
	24.0									-24.0	-18.2	-22.8	-34.5
	25.0									-24.0	-18.2	-22.9	-34.2
	26.0									-24.0	-18.4	-23.7	-35.2
	27.0									-23.4	-18.9	-24.6	-35.1
	28.0									-24.0	-20.1	-25.7	-35.1
	29.0									-24.0	-21.6	-27.0	-37.0
	30.0									-24.0	-23.2	-28.2	-38.0
	31.0									-24.0	-26.9	-28.4	-41.2
	32.0									-24.0	-29.1	-31.0	-45.4
	33.0									-24.0	-31.7	-33.5	-47.4
	34.0									-24.1	-33.6	-33.0	-50.6
0925	35.0						20			-24.1	-41.6	-32.5	-54.4

0dB = 0.316 Vrms

DATE 2/11/77

SHEET 10 OF 10

BY D.A. KIDD

DRIVE (VRMS) 0.004

DC BIAS

PRECHARGE

OIL TEMP

NOISE TEMP

WATER TEMP

ANALYZER CORRECTIONS

OFFSET

SYS. GAIN

MON HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

CAL HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

ACCELEROMETER

CORRECTION

FACTOR

TYPE ANALYZER

S/N

TIME		MONITOR PANEL										SPECTRUM ANALYZER (0.3 HZ BW)				
(EST)	(Hz)	MTR CUR	MTR INT	PUR SUP PUMP FLOW (GPM)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTINGS (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELEROMETER (dBV)	CAL HYDRO-PHONE (dBV)		
	6.0							10			-20.5	-19.4	-29	-35.4		
	7.0										-20.4	-18.0	-27	-33.6		
	8.0										-20.3	-17.0	-27	-33.3		
	9.0										-20.1	-16.2	-26	-32.1		
	10.0										-20.1	-16.0	-25.3	-31.8		
	11.0										-20.1	-15.6	-22.2	-31.2		
	12.0										-20.0	-15.5	-20.3	-30.5		
	13.0										-20.1	-15.6	-20.4	-30.0		
	14.0										-20.1	-16.1	-20.6	-31.9		
	15.0										-20.0	-16.2	-17.9	-31.8		
	16.0										-19.9	-16.4	-17.4	-32.6		
	17.0										-19.9	-17.0	-18.8	-32.4		
	18.0										-19.9	-17.3	-18.6	-32.6		
	19.0										-19.9	-18.0	-19.3	-32.9		
	20.0										-19.8	-19.0	-19.5	-34.8		
	21.0										-19.9	-20.1	-20.1	-35.2		
	22.0										-19.8	-21.7	-20.2	-37.6		
	23.0										-19.9		-21.4	-40.3		
	24.0															
	25.0															
	26.0															
	27.0															
	28.0															
	29.0															
	30.0															
	31.0															
	32.0															
	33.0															
	34.0															
	35.0															

DISCONTINUE TEST REPEATABLE  
OUTPUT IS NOT REPEATABLE  
AT THIS LOW LEVEL

DISCONTINUE TEST REPEATABLE  
OUTPUT IS NOT LEVEL  
AT THIS LOW

DATE 2/1/77  
SHEET OF  
BY B DAV

DRIVE (VRMS)

DC BIAS

PRECHARGE

OIL TEMP

NOISE TEMP

WATER TEMP

ANALYZER CORRECTIONS

OFFSET

SYS. GAIN

MON. HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

CAL. HYDROPHONE

TYPE

SENS

DIST

SPREAD LOSS

CORRECTED TERMINAL

SENS

ACCELEROMETER

CORRECTION

FACTOR

TYPE ANALYZER

S/N

MONITOR PANEL				SPECTRUM ANALYZER (0.3 HZ BW)										
TIME	FREQ	MTR CUR	MTR INT	PUR SUP PUMP FLOW (GPM)	PUR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN (dB)	FIRST STAGE (dB)	MAIN STAGE (dB)	DRIVE LEVEL (dB)	MON. HYDROPHONE (dB)	ACCELEROMETER (dB)	CAL. HYDROPHONE (dB)
(EST)	10	30	70		2068	1137	1040	30	-27.4	-22.4	-16.1	-12.4	-17.9	-28.0
	13		80						-31.1	-24.4	-16.0	-12.8	-18.7	-27.3
	10	28.8	25		2077	1147	1038	30	-26.7	-22.6	-16.1	-12.1	-17.6	-27.8
	23								-41.2	-20.1	-15.7	-18.3	-24.4	-34.2

